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CARPENTRY AND BUILDING

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NOTES AND COMMENTS.

GUARANTEED roofing plates have been very popular among architects and builders ever since their introduction. When these goods were first put upon the market it was the architects who specially welcomed them, because they saw in the scheme the possibility of securing through guarantees good tin roofs. When, a little later, stamped sheets came into vogue, the architects of the country recognized in them another element of security against fraudulent contracts. In the interval guaranteed plates and stamped plates have multiplied. Quality has been greatly improved, taking the plates collectively or as a class, but at the same time competition has found ways by which plates can be cheapened while they are still subject to specific guarantees. This is true, notwithstanding that the individual sheets are stamped, and that the appearance of the plates is excellent in every particular. A few pounds more or less to the box (112 sheets) is scarcely noticeable when single plates are considered, but such variations naturally affect the cost of manufacture and importation. Hence some plates can be sold for less money than others that are apparently of no better quality. IC and IX, as terms designating gauge or thickness, were never as specific as such things should be, and of late years they have lost what little meaning they formerly had. One tin-plate house is at present importing three different plates, the IC's of which vary in weight per box from 5 to 15 pounds, while the difference between the lightest of the cheap plates now on the market and the heaviest of first-class plates is even greater than this. Hence it will be seen that designating the plates to be used for a certain roof as IC or IX is not very definite. These facts lend special interest to the announcement which Merchant & Co., of Philadelphia, make just as we go to press. In order to enable architects to be more specific in their descriptions of the plates to be used upon their work, this firm state that hereafter, in addition to the guarantees under which their plates are sold, and the stamping of the individual sheets, each box will be branded with the actual net weight of the plates packed in it. They invite a comparison of their weights with those of others. The result of this, we take it, will be to direct attention to prices on the basis of pounds weight—which is a fairer competition, all things considered, than has existed in the past.

PUBLIC buildings in Chicago would seem to require a larger amount of repair work than any similar structures in other parts of the United States. A few weeks since the superintendent of repairs sent to the supervising architect, at Washington, a long report, giving an itemized statement of the repairs necessary to put the Government buildings in good condition during the coming fiscal year. The report states that the repairs necessary for the custom house, exclusive of those now in progress, include the painting of the interior and exterior; coppering the cornice projections of the second, third and fourth stories; completing the plumbing and sewerage; extending the post office; extending the drive way to the postal depository; renewing the flooring and tracks in the work-rooms; extending and repairing the heating apparatus; reglazing and supplying a large quantity of new hardware. The painting of the building is declared to be necessary, not only to give it a respectable appearance, but to prevent the stone from scaling and disintegrating, and to save great additional expense if this is delayed much longer. Chicago would seem to be suffering from poor building material in many instances, as well as inadequate construction in many others. Haste in building, engendered by the emergency of the great fire, and the necessities of the years immediately following it, would seem to be in part responsible for some portions of the large repair items which are constantly being mentioned in connection with Chicago buildings.

WE referred in a recent issue to the peculiar conditions under which the new State Capitol of Texas had been built. At about the time that our remarks appeared in print, a report was very generally circulated throughout the country that the building had been found defective and that the dome was unsafe. Prompt measures were taken by interested officials to disprove the assertion. Three architects—namely, Harrod, of New Orleans, Clayton, of Galveston, and Heiner, of Houston, were appointed by the Governor of Texas to examine the building and to report upon its safety. According to reports telegraphed to the daily papers early in the month, these architects, after a thorough examination, declared the great dome safe, and proceeded to assert that the building is one of the finest, most magnificent and best built granite structures in the country. The dome of the building is 310 feet high. The architects of the structure are E. E. Myers & Son, of Detroit, Mich.

THOSE of our readers who have followed the freaks of Queen Anne architecture, early English, Continental and other phases of the same general sort, and who are realizing that there is a change gradually coming over the fashions and styles of architecture, no doubt are interested in knowing just what the next fashionable craze is likely to be. According to some well-informed persons, we are at present threatened with a Gothic invasion, if the term is allowable. Gothic features in street architecture for dwellings, stores and public building, as well as for churches, schoolhouses and the like, have been manifest for some time past. The new style has made its appearance in some places with considerable ostentation, and it must be confessed that it is not always in a form that harmonizes with a critical or exacting taste. The most that can be said of the present change is that in some sense the Gothic revival will be a grateful relief not only from Queen Anne, which has been the rage more recently, but the Renaissance which preceded it, and other styles so unique, not to say grotesque or nondescript, that it would be puzzling to classify them with any degree of accuracy.

RIGHT here we may utter a word of caution to ambitious architects in their strife for startling or novel effects against pushing the Gothic to extremes. Otherwise, it would be difficult to distinguish between the palatial residence and the average church or chapel. Gothic architecture, at present, distinguishes the work that is being done in the city of Philadelphia perhaps to a larger extent than any other city in the country; and a writer in one of the papers published in that city says that the cultivation of the Gothic in a city like Philadelphia would seem slightly anomalous for several reasons. Some of these will readily occur to persons who take an interest in architectural designs, which change with the fashion of the times. There is certainly a number of broad steps between the severely plain, which characterized Philadelphia at an early date, the Queen Anne which has prevailed in the immediate past, and the Gothic which now begins to be seen in its streets. The writer referred to concludes that, until something more satisfactory is found, it is best to accept Gothic architecture for whatever it may be worth.

ONE of the notable features of recent issues of the Philadelphia papers is an account of the growth of that city, with a list of the prominent buildings erected during the past five years. The list is a long one and would seem to indicate that prosperity hovers over the "City of Brotherly Love," and that all engaged in the building industries are busy. From January 1 to October 31, 4550 two-story buildings were erected in that city, and in addition 1958 three-story buildings. In the same period 560 other separate and distinct buildings were put up, including 49 factories, 65 stores, 28 warehouses, 41 offices, 170 stables, 44 shops, 27 boiler houses, 4 breweries, 8 churches, 9 school buildings, 3 hospital buildings, 3 market houses, 6 banks, &c. The total number of buildings in Philadelphia for the time named is upward of 7000. The total number of buildings for five years is 26,752.

THE effect of the bricklayers' strike in Chicago, as summarized by one of the leading brick manufacturers in that city, is, that at the close of the bricklaying season 50,000,000 more brick remained on hand than at the same period in 1886. The total output for the year just closing was 392,000,000, an increase of about 9,000,000 over the preceding year. The strike lasted 24 days, and 20 days were lost on account of wet weather, leaving 112 working days. This would make the daily production of finished work 3,500,000. The brick manufacturers say that the demand for brick is good, and they predict that the stock on hand will be exhausted by the beginning of next year.

JOHN WALKER, manager of the Walker Mfg. Company, of Cleveland, Ohio, read a paper at a recent meeting of the Civil Engineers' Club, of that city, on the system of heating and ventilating the company's works by hot air. The works are scattered over 7 acres of land, and it became a problem of some difficulty to heat them satisfactorily. The process now employed was adopted for the work by Mr. Walker. Air is taken into a blower from outdoors, passes over a coil of steam pipe, and is forced through earthenware conduits underground for several hundred feet. Last winter the method was tried for the first time, and it was successful beyond the expectation of its projector. In the summer the air is forced through the pipes without submission to the steam radiator, and cools the air in the different departments several degrees below the outdoor temperature. With this system it is possible to keep an equable temperature in the works, summer and winter. The advantages of the system are economy, good ventilation and convenience. So far as known, this method has never been used in the heating of factories before, though it has been applied to public buildings. The entrance of a strong current of warm air, and its tendency to carry up with it all impurities, keeps the factory free from smoke and the air wholesome. The pipes, in passing from one building to another, pass under open ground for several hundred feet. It was noticed last winter, when the blower was first turned on, that no heat reached the opening at the further end. As soon as the ground became heated, the air entered the building heated. When snow fell, it was melted for a space of 8 feet across the pipes, which are buried 4 feet. In the hot weather last summer the temperature was kept at least 10° lower by means of the air blast.

A NUMBER of very disastrous fires have occurred in the last few years in the class of buildings known as "storage warehouses." This fact has lead insurance men to inquire very carefully into the causes of the fires. For the most part these fires are the most puzzling conflagrations. As the buildings are constructed they invite fire, and as they are used they appear to be packed to burn; and yet, taking other considerations into account, it would seem that such storages ought to be about the safest and the least hazardous of any that exist. They may be under the care of watchmen; yet, when the fire breaks out the place of its origin is seldom ascertained. The fire makes headway with a stubborn, rather than a quick combustion, and when the firemen reach the spot the building is filled with dense smoke, which effectually stops all attempts to fight the burning matter within. When the fire is attacked from the exterior the windows are found blocked up with the contents of the building, which greatly obstruct the application of water. The result is that the fire is of necessity left to burn itself out. If fresh air could be excluded it might be put out by smoke suffocation.

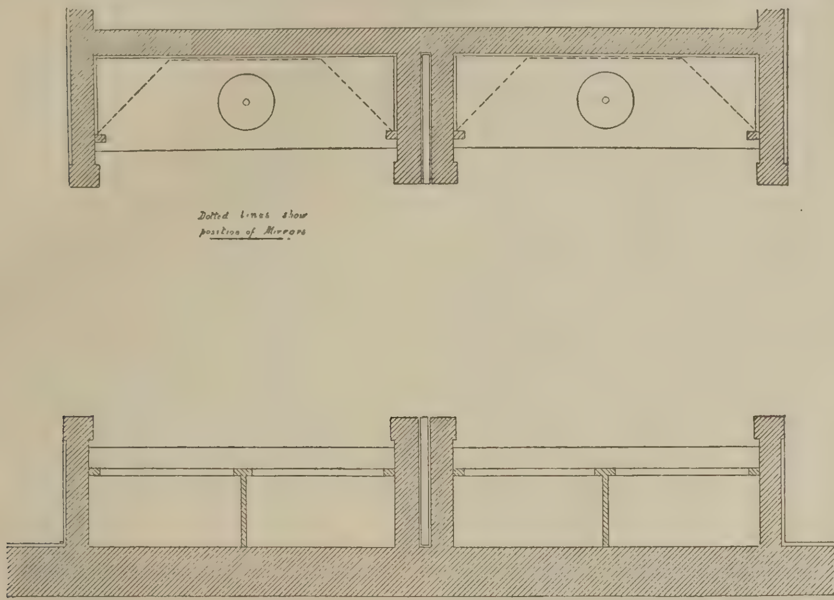
ONE of the insurance papers, speaking of storage houses and the liability of fires in them, asserts that the safety warehouse of the usual pattern consists of a building, say, 50 x 100 feet, 5 or 6 stories in hight, with the interior construction of wood, with open staircases, and with elevators at each end. Along the sides of each floor are wooden slatted bins, from floor to ceiling, ranged from end to end, close up to the windows with only a narrow passage-way between the rows of bins. In these bins the goods are packed tightly, leaving just enough air space to insure burning. If a fire were to be discovered at its beginning in one of these bins, it would be a difficult job to get at it, and every attempt to put it out would involve the danger of spreading the fire among the inflammable material. The aim of fire-proof construction should be to confine the fire to the floor or apartment in which it originates, avoiding fire communication by inclosed stairways and inclosed elevators. It would seem that there is much to be learned by those who have in charge the construction and management of such buildings as we have referred to, in order to make them what they are popularly supposed to be—safe repositories for goods.

SAFE breaking and burglary in general are not often classed among the mechanical trades; and yet burglars, of necessity in many cases, are skilled men employing mechanical devices and depending for the success of their operations upon the judicious employment of mechanical principles. Burglary, in its way, is an industry, and is one that is numerously followed in cities and large towns. Some one, if we mistake not a safe manufacturer, has gone to the trouble of compiling a summary of the processes which burglars employ in the present advanced state of the art. Our readers may be interested in the list: First, there is the driving of wedges into door jambs by which the tenon is forced out of the packed groove and explosives inserted around and into the rabbet and stepped flange. Second, there is the application of the drill on material represented to the general public as drill proof; and right here we might remark that the burglar's art has advanced step by step with the art of safe making. It would seem that whenever an "absolutely" burglar-proof safe has been brought out by manufacturers, some burglar has stepped forward with tools and materials by which he was able to "crack" it, making use of a term employed by the fraternity. By such instances as these, the progress of the burglar's art has been chronicled. The third specification enumerated in the list referred to is the application of the Harris Stripper in peeling plates from the riveted and machine screw fastenings. Fourth, the application of the Burton Pulling Wrench by which lock and bolt spindles are drawn out of doors. Fifth, the application of the Mason Ripper, an ingenious implement of burglary used on safes or vaults faced with iron. Sixth, the application of the powder pump in forcing explosives around the jambs of safe doors and into crevices created by wedging and with the use of jack screws. Seventh, the explosion of dynamite on the surface of the door by which bolts and bolt frames are dislodged by concussion. This list is by no means complete, and might be greatly extended if the minutia of the burglar's art was closely inquired into. As it is, burglary, like honest trades, requires skill for its performance. We have often been impressed with the idea that if the skill that a burglar uses was to be devoted to an honest trade the artisan would rise to a position of fame and independence. But it would seem that some men prefer crooked ways, irrespective of the rewards that virtue holds out.

Closet Arrangement.—Perspective View in Double Closet.

THE importance of a carpenter about a building, we presume, is very generally recognized by our readers. According to a writer in one of our English exchanges, he has more to do with the construction of a building than any other person employed about it. He supersedes the architect in many cases. The word in the Greek language signifying architect may be translated carpenter, which indicates that the carpenter was, indeed, an important functionary in ancient building operations, although the

ordinary conception of ancient buildings, formed in part at least from the illustrations of the stone temples which have been handed down to us, very generally leaves out of the account a wood worker of any kind. In modern architecture, whether a building is to be erected of brick or stone, it is the carpenter who takes the lead in the

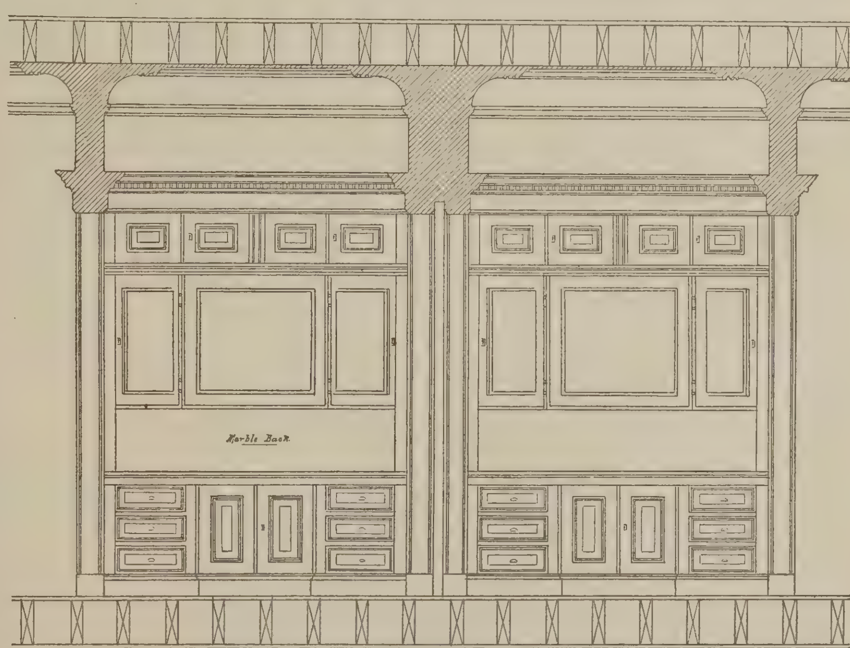


Closet Arrangement.—Plan of Closet. Scale, ⅜ Inch to the Foot.

work. He forms all the patterns, guides, templets and centers for the bricklayer and mason to work to. If a hut is to be built of mud, the poorest of materials, the first step is to procure boards adapted by the carpenter for forming molds by which this mud is brought into the required form. This, however, is an extreme illustration. In the interior of a house everything depends on the carpenters and most things, indeed, are done by him. The floors and the doors and the windows, are almost entirely his work, and he often forms moldings for the cornices, although they may be put up by the plasterer. If we could improve the taste of the rising generation of carpenters we should have no fear of operating through them on all the various artisans employed in the construction of houses, and, ultimately, on the general taste of the whole community. This fact is generally recognized in business, for the shrewd advertiser, whenever he wants to make a market for his goods, picks upon the carpenter as the man most likely to appreciate what is really good, and to advocate the employment of that which adds to the convenience or comfort of a house or cheapens its cost.

Porphyry Quarries of Egypt.

Egyptain porphyry has been sought after from the earliest times as one of the most precious building stones. Ancient writers differ as to the whereabouts of the quarries from which that stone was obtained, and in modern times they were literally rediscovered by Burton and Wilkinson in 1823, and subsequently visited by Lepsius in 1845. The information published by these visitors proving of no immediately practical value, Mr. W. Brindley determined to follow in the footsteps of Wilkinson, and in a paper, of which an abstract is published in *Nature*, gives an account of his visit. Having examined the ancient granite quarries at the first cataract, which supplied deep red, rose and dark gray stone, which was quarried by metal wedges, and not wood (as is generally supposed), the author started from Keneh with a small caravan and supplies calculated to last three weeks. Passing the remains of several Roman stations the author, on the fifth day, reached an excellent well in the charming Wadi Kitar, hemmed in on three sides by precipitous mountains. Soon after leaving this valley he crossed the watershed (2400 feet above the Nile), and then traveled along the flank of the immense porphyry mountain of Gebel Dukhan as far the old Roman station with an old fort. The morning after his arrival the author ascended to the top of a pass (3100 feet) without having found even a fragment of porphyry; but espying by the aid of a good field glass porphyry coloring on the opposite mountain he resolved to go there, and his delight knew no bounds when he found the ground there strewn with pieces of the most sumptuous porphyry, and discovered a pitched way or slide, 16 feet



Elevation of Closet. Scale, ⅜ Inch to the Foot.

wide, down which the blocks were lowered. Further examination led him to the locality where the Romans had extracted their grandest masses, and he found that these quarries had yielded not only the usual spotted variety, but also the brecciated sorts and green-grays. The great quarry was at an altitude of 3650 feet above the sea, and a road led down from it to an ancient town with workshops. A path led hence to the old town in the valley, further up which are the ruins of a Roman temple.

Closet Arrangement.

The planning and arrangement of closets, in connection with chambers in dwelling houses, is a matter of considerable importance to the householder, and one in which the architect and designer have ample play for skill and ingenuity. In the accompanying perspective view, elevation and plan, we show how the problem of closets between adjacent bedrooms has been managed in some houses in West 122d street, near Sixth avenue, New York. The architects of the building are Messrs. Thom & Wilson; the builders are Messrs. John & G. Ruddell. The work in question was neatly done in ash. The features of construction and finish are so clearly shown in the engraving that very little need be added in the way of particulars. The division between the two closets is in the shape of sliding doors, the pockets for which are clearly shown in the plan; but the feature that will command attention, and something that will be appreciated by the occupants of the rooms, to which these dressing closets are attached, is the disposition of the mirrors above the basin. These are set at angles in a way to be very satisfactory for toilet purposes, and also to obviate the necessity of a special kind of mirror that is sometimes employed.

THE PLATES.

In Plate I there are presented the elevation and floor plans of a frame cottage designed by S. W. Shepard, reference to which is elsewhere made in this issue.

In the upper part of Plate II are shown two designs for parquetry flooring, designed by R. Fischinger. The lower portion of the same plate contains elevation and sections showing construction of a doorway. It illustrates European construction, so far as joints and features of design are concerned.

In the upper part of Plate III there is presented the elevation and floor plans of a house adapted for the joint occupancy of three families. The author of this design is Charles E. Hebberd; a description of the design is elsewhere given. In the lower part of the same plate is an interior view illustrating the application of sliding blinds in interior finish, in the place of swinging blinds. It also shows the use of modern Venetian blinds. The engraving is from advance sheets of a catalogue, now in press, by the Venetian Blind Company, of Burlington, Vt.

In Plate IV there is presented a very ornate construction in wood mantels, designed and built by Hegan Brothers, Louisville, Ky.

Massachusetts Institute of Technology.

We have on various occasions referred to the Massachusetts Institute of Technology, an institution that is doing great good in the way of practical education, and which, among other features, has a course in architecture. Some particulars concerning its origin may be of interest to our readers. The foundation of the institute was upon a plan including a Society of Arts, a Museum of Arts and a School of Industrial Science. The original charter was obtained in 1861. Of the three integral parts of the institute the Society of Arts was first organized, and has continued ever since to hold semi-monthly meetings from October to May of each year. The School of Industrial Science was opened in February, 1865, in temporary rooms in Mercantile Building, Summer street, with 27 pupils. The first building of the institute, now known as the Rogers Building, was erected on land conceded by the State, and was occupied by the chemical department in the spring of 1866. In the fall of the same year the whole School of Industrial Science, together with the Society of Arts, was removed to the same structure. Two subsidiary schools have been organized under the control of the corporation of the institute —one, the Lowell School of Practical Design, the other, the School of Mechanic Arts. Less formal action has been taken for carrying out the purposes of the founders of the institute in the establishment of a Museum of Arts. Varied and valuable collections have been made, which, taken together, would constitute no inconsiderable foundation for such a museum; but thus far this material has been divided, so that the portions especially relating to the individual departments of study and research might be placed within easy reach of the students and teachers respectively concerned.

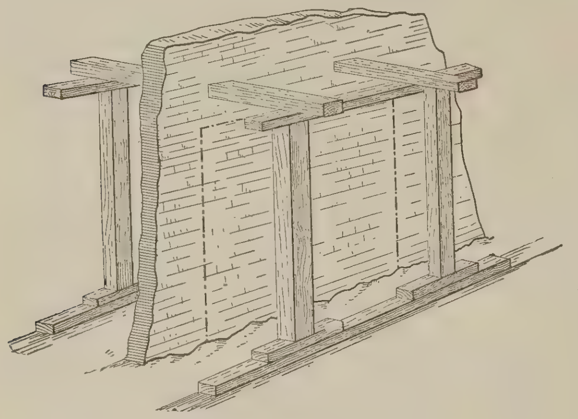
The buildings now occupied are (1), the Rogers Building, on Boylston street, devoted to the engineering departments and to instruction in mathematics, mechanics, literature, history, political science, geology, mineralogy and physiology; (2), the new building, corner of Boylston and Clarendon streets, mainly devoted to the departments of chemistry, physics, civil engineering and architecture and to instruction in language; (3), a series of laboratories, drawing and recitation rooms, at the foot of Garrison street, mainly devoted to work in the mechanic arts and to the instruction of the mechanic art school and the Lowell school of design; (4), a gymnasium and drill hall, on Exeter street.

The School of Industrial Science provides an extended series of scientific and literary studies, and of practical exercises. The course of study includes the physical, chemical and natural sciences and their applications; pure and applied mathematics, drawing, the English, French, German and other modern languages, history, political science and international and business law. These studies and exercises are so arranged as to afford a liberal and practical education in preparation for active pursuits, as well as a thorough training for most of the scientific professions. The trustee of the Lowell Institute has established, under the supervision of the Institute of Technology, courses of instruction, generally given in the evening, and open to students of either sex, free of charge. These courses are more or less varied from year to year by the omission or interchange of particular subjects, but include, in their entire scope, instruction in mathematics, mechanics, physics, drawing, chemistry, geology, natural history, biology, English, French, German, history, navigation and nautical astronomy, architecture and engineering.

The Lowell School of Practical Design is also free, the expenses being borne by the Lowell Institute. The students are taught the art of making patterns for prints, ginghams, delaines, silks, laces, paper hangings, carpets, oil-cloths, &c. The course is of three years' duration.

Notes on Shoring and Strutting.

In all ages of building, shoring and strutting has been an important factor in construction. Whether it be merely in the erection of a scaffold or in the propping up of a building, it plays an important part in the buildings of all countries. It is a secondary science, one only for temporary use, and as soon as the object for which the shoring was erected is completed, the shoring is removed, there being no further occasion for it. I am here dealing with buildings that require actual support, not with the erection of scaffolds, with shoring, which has for its object the temporary support of heavy weights and upon which the safety of the building, and it may be of its inhabitants also, entirely depends. This is by no means an unimportant study—as a study, it is useful in many ways, and in the consideration of it knowledge will be gained which will be found of the greatest advantage in many branches of building science. It has its every-day and its exceptional application—the exceptional is an advanced stage of the science, while the every-day application is but rudimentary. We never need go far out of our way to see shoring of some kind; houses are being turned into shops in almost every other street, and in the case of old buildings or buildings badly constructed, we have continually examples of one kind or other of shoring. We must know, if we have any superintending of shoring to do, how to use our timbers to the greatest advantage and how to distribute superincumbent weights in the most judicious manner, and so as to economize both space and material without danger to the structure we have to support. It will not do to copy what we have seen done daily—parrot-like, because, in such and such a case it was successful—every case must be taken on its own merits, for in hardly two cases will all the circumstances be the same.



Shoring.—Fig. 1.—Dead Shoring.

The first consideration must always be the nature of the bedding or the ground on which the shoring is to rest. There must be no doubt as to the stability of this, for the success of the whole undertaking depends upon it. Mass your timbers as you will, and bolt and strap them together as much as you like, but if the bed is not secure and firm you may as well have no timbering at all for all the resistance to thrust you will gain. Consider for a moment what is the use of shoring and the occasion of its introduction. The decay of a building begins the moment the scaffold is struck. If the building is well put together it will not show any signs of decay for years, or in the opposite case it may come down with a run any day. Decay is hastened by neglect; there may be some unforeseen failure of the foundations or it may be faulty construction. The most usual of dangerous structures are those in which the brickwork is badly bulged or cracked —out of the upright or decayed—decayed timber, tiles and stonework faulty, loose and ready to fall. The insecurity need not of necessity render danger imminent, but it does not follow that, therefore, nothing should be done. "A stitch in time saves nine." A wall is often found to be split, only the outer half-brick work which has bulged through insufficient bonding or some other cause of a particular case. Whether it is the half or the whole wall that has bulged, it cannot be supposed that it can be of as great strength as a straight wall, and, therefore, it is better to see to its repair than trust to time to showing more definitely what is the matter before anything is done.

Walls crack most often from the sinking of foundations, and in this case the course of the crack usually tells where the evil begins. A recent crack may be detected by its clean edges, and pencil marks or strips of paper across the crack will show whether it is increasing or not. Walls will lose their uprightness from the decay of timber incorporated with them; from insufficiently controlled thrust of the roof timbers, as well as from failure of the foundations, and want of ties, bond or lateral support causes buildings to yield under weight or from the pressure of wind. In any case, if the building is to be repaired and preserved, recourse must be had to shoring. Temporary support must be given while repairs are being executed, and that may be of such a nature and extent that the shoring will have to maintain an entire wall, at least, while the parts that should have been sufficient for all support are cut away and replaced with new work. There are different kinds of shores for different objects. The "dead shore" is the most solid (Fig. 1), and its position is where a great weight has to be supported whose pressure is directly down ward. Of this we have constant illustrations and examples on a small scale, when alterations to business premises take place. Perhaps it is the ground floor front of a

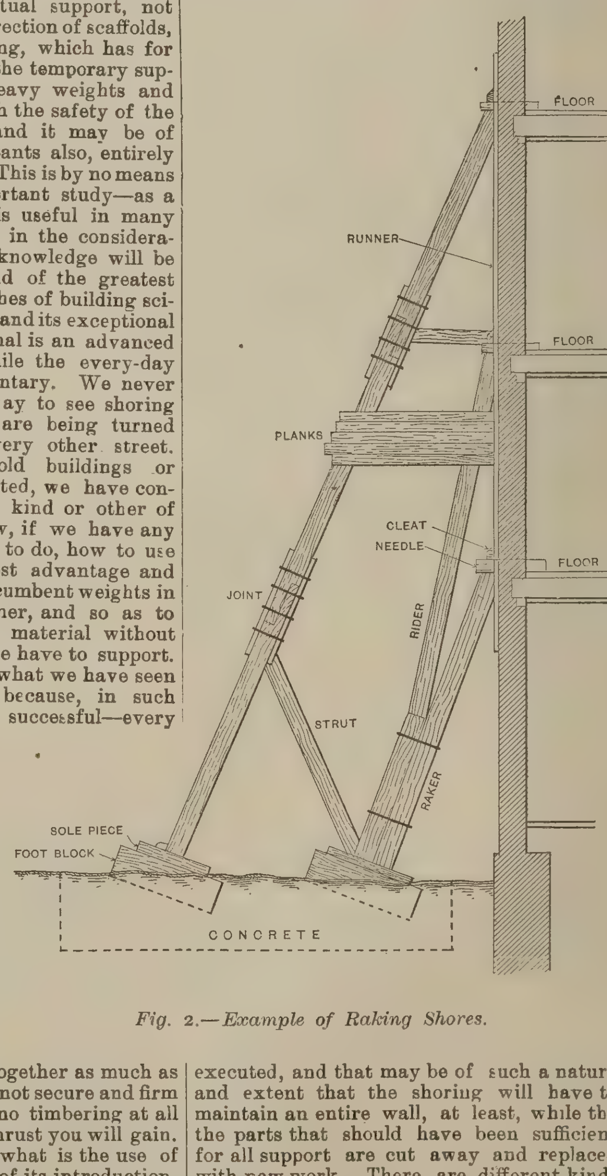
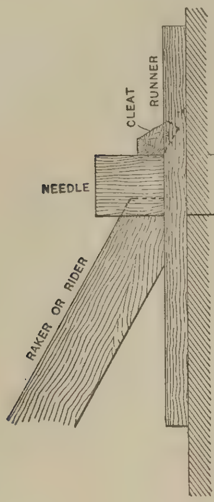


Fig. 2.—Example of Raking Shores.

house that is to be turned into a shop. For this upright posts are erected on a solid base, the weight they bear is distributed by the beam on which they stand, and the probable crushing of the fibers of this beam is prevented by the introduction of the "sole piece," a short timber placed immediately under the feet of the uprights. A like arrangement is erected on either side of the wall, horizontal pieces are placed on the tops of each set, holes are cut through the



Shoring.—Fig. 3.—Detail of Top of Raking Shore.

wall above the part to be cut out, heavy needles are passed through these holes and their ends made to rest upon the horizontal pieces at the top of the posts; wedges are driven in to tighten it all up, and when it is all secure the cutting out of the wall below may begin. This "dead shoring" is used in the most difficult operations, as well as in the simplest, and it is, in fact, the only safe principle for sustaining the dead weight of a wall.

The next kind of shoring is that used for the support and propping up of a wall that has either bulged from too heavy a weight placed against it or on the floors it supports; from too heavy a roof on account of the spreading of the roof timbers from decaying and opening joints, or the cause of the bulging may be that the foundations have moved, causing the walls on which the roof and floors rest to receive an undue proportion of their weight. These are known as "raking shores," and, like the dead shore, depend on the bed for support. In Fig. 2

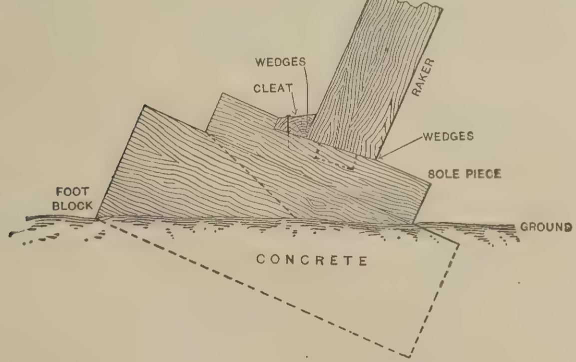


Fig. 4.—Detail of Foot of Raking Shore.

I have shown a case in which it was worth while to go to some expense and carry out the work of shoring very thoroughly, there being time to make the shoring complete. The floors overloaded are pushing out the wall; the supports therefore to be of the greatest use must prop up the walls at the levels of the floors. A bed of concrete is prepared in a pit dug in the ground a few feet away from the wall. While it is still soft a heavy piece or block is sunk into it, so as to give its surface a slope which shall be as nearly as possible at right angles to the raking shores. The lowest part of the wall is, of course, the heaviest; that must be shored first with a "raker," resting on the "sole-piece," which has been laid upon the foot block, and which is wedged up when the raker is in place. The upper end rests upon a plank or runner laid against the wall to prevent the crushing against the bricks of the end of the raker. A "needle" is put through it, and the wall and the top of the raker is roughly cut to fit into the right angle formed by the needle and the plank. To give further resistance to the pressure of the shore a cleat is firmly nailed to the plank above, and resting on the needle. To reach the upper floor we have to start fresh from the bed of concrete, and we begin by laying another raker shorter than the first against the back of it, letting it stand on the sole-piece and strapping them firmly together. On the top of this new raker stands the riding shore, the upper end resting against the plank, with pin and cleat complete, as in the case of the raker. Floor above floor may be supported in like manner, provided that the base has been made large enough to take in all the rakers. In the case of very high walls it is sometimes necessary to piece the riders, and this must be done with the greatest care, so that there may be no failure at the joints, which are naturally the weakest parts. Where it is necessary to join timbers they should be halved a good length and then strapped together in two or more places. Straps are better than bolts, as bolt holes necessarily take away from the strength of the timbers, and straps can easily be wedged up tight. In addition to straps it is well to put good thick pieces of wood planks or scantlings on the back and under side of the riders and strap these round. Additional support may be given to the rider at a joint by putting a strut to it from the head of the rider or raker below, and also by planks spiked horizontally from the rider to the plank against the wall.

For the foot blocks, on which so much depends, the firmest construction of all is to let the foot of the shore into the sole-piece as a principal of a roof is let into a tie beam and then to drive in wedges under the sole-piece. With rotten or really shaky walls there may be a danger of shaking them by wedging up, in which case the system of levering the shore up to its bearing with a crowbar is preferable, but this system may be combined with a more satisfactory method of notching the sole-piece, as shown in the sketch, sufficiently far back from the intended position of the shore to allow the bed of the shore to clear the notch when it is first put in position, and after it is levered up to its bearing the cleat can be inserted, and, if necessary, can be tightened up by a hardwood wedge driven in between it and the shore. With regard to the cleat at the top of the shore, if the needle is of sufficient thickness, the cleat is unnecessary, as with so short a leverage it cannot be wrenched up. The proper method of fixing this cleat is shown in the sketch. In narrow streets where shores from the roadway would interfere too much with the traffic, walls are sometimes shored from the opposite buildings by means of a horizontal piece between two upright planks against the walls. As the length of the timber may cause it to sag or bend, struts are used which act upon each other and help in the support of the wall. Stiffening pieces are then spiked to the beam between the ends of the struts and the whole is complete. Wedges can be driven in to tighten up the struts if required.

In concluding, I will quote from Sir Gilbert Scott's "Professional Recollections" about a strange and very durable piece of shoring he once came across. It was during the restoration of St. Alban's Abbey, in which work one of the greatest engineering feats in conjunction with architecture was successfully carried out—viz., the raising to its original perpendicular position of the whole of one of the walls of the nave. He says: "We found under the southeast pier" [of the great tower] "the evidence of a marvellous fact. Its foundations had been executed into a sort of a cave, some 5 or 6 feet in diameter which was filled in with rubbish, mere dust, with some timber struts among it. I can only conceive that this was done with the intention of destroying the building by setting fire to the struts but that the process had been suspended." Sir Gilbert Scott's son, who edits the book, adds the following foot note. "It appears that when the work of destruction was counter-

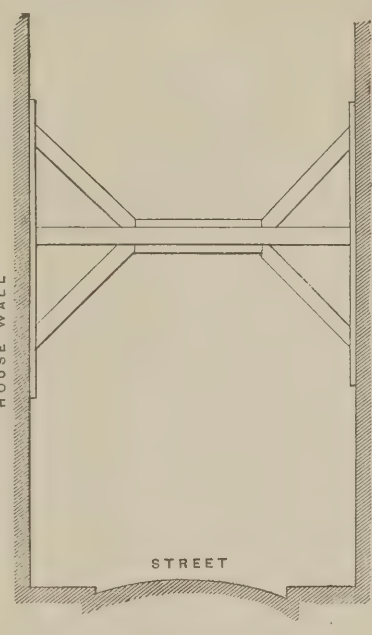


Fig. 5.—Example of Flying Shore.

manded no pains were taken to make good the mischief already done, and the tower has remained propped up on short oaken struts from the Reformation, A. D. 1549 until the recent repair, 1870."

Greek and Gothic Architecture Compared.

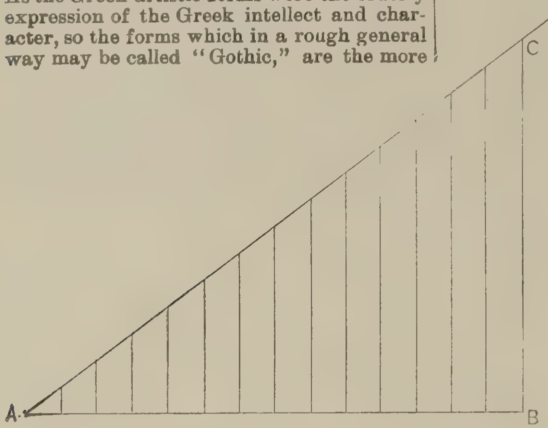
The following comparison of the Greek and the Goth, so far as relates to the art and architecture of the two, is from the writings of J. Shelton:

The Greeks lived in a land where the air was transparently pure, where the mountain line cut an unclouded sky, where no phantoms of mist or shadow ministered to the imagination. He loved the pleasant life of the plains; he was urbane, friendly, communicative; a simple and elegant decorum characterized his manners. His moral conceptions were definite though limited. Other than a pleasurable sense of healthy life, he acknowledged, perhaps, no well-being after which men should strive; yet he could vindicate the justice of the gods who visited the sins of the fathers upon the children; he practiced the virtue which never offended the seemly; he recoiled instinctively from the cruel, the rude, and the uncomely. The "clear line, the definite grace, and the sunny expansiveness" of his poetry were thus reflected from a life which loved the orderly and symmetrical, which avoided the intricate and the mysterious, which shrunk from the terrible, which, in its abhorrence of excess and in its habitual moderation, unconsciously obeyed the Delphic precept, Μηδὲν ἄγαν, "Not too much of anything." His art in poetry, in sculpture, in architecture, in painting, ministering rather to grace than to passion—the serene expression of a beautiful idea—never impatient, never exacting, never discontented—yet lacked variety and individuality. This avoidance of individuality is perhaps not the least noticeable trait alike of his art and of his laws. A Greek citizen regarded freedom less in the light of personal unrestraint than of national independence;

and a Greek audience witnessed upon the classic stage rather, as it were, the procession of large and tragic ideas than the swift and shifting movement of present passion. As the Greek artistic forms were the orderly expression of the Greek intellect and character, so the forms which in a rough general way may be called "Gothic," are the more or less orderly expression of the modern mind. The "Goth" was a child of the mist. The mist clung to his mountains—there were mysterious depths of gloom in the interminable forests, where he followed the deer and the wild boar to their lairs. Addicted to solitary commune, reserved yet passionate, familiar with the grand and impressive forces of nature, sullen sometimes as his own skies, yet breaking out sometimes into quaint humor and inextinguishable laughter, this man would by natural temperament alone have had little in common with the Greek.

To Divide a Straight Line into any Number of Equal Parts.

It goes without saying that a knowledge of geometry is necessary in mechanical drawing. Perhaps the most simple problem in geometry and the one which occurs most often is that of dividing a space or a straight line into a number of equal parts. In setting out an architectural drawing, one can scarcely proceed for two minutes together before it will become necessary. In putting in the stairs, both in plan and section, in setting out the balusters, the joists and rafters in section, and in a multiplicity of of other cases it is necessary; in fact, the the draftsman may be said to be surrounded by the problem throughout his operations. But because it is simple and frequently occurs, it does not follow that draftsmen, as a rule, are acquainted with the best and quickest means of solving it under different circumstances. It is of sufficient importance then to merit a little consideration here.



To Divide a Straight Line into Any Number of Equal Parts.—Fig. 1.—A Common Method.

The books give two methods of accomplishing this object, which, although pretty generally known, are here given for the sake of clearness. Let A B, Fig. 1, be the given line which it is desired to divide up into, say, seven equal parts. Set off a second line, A C, at *any* angle with A B. Take the dividers, open them to any convenient distance and step off on A C seven equal spaces. Now join the seventh point C with B, and from each point on A C draw back a line parallel to C B, when the line A B will be divided into seven equal parts, as required. The second method of working out this simple problem is very similar, but not less troublesome and lengthy. E F, Fig. 2, is, in this case, the line to be divided into, say, five equal parts. From E draw a line, E G, at any angle to E F, and from F draw another line F H, parallel to E G. Now open the dividers to a convenient distance and set off along E G five equal spaces. Then set off the same number of spaces along F H without altering the distance in the compasses. Now join the respective divisions by lines, as shown dotted in Fig. 2, and the line E F is divided into five equal parts, as required.

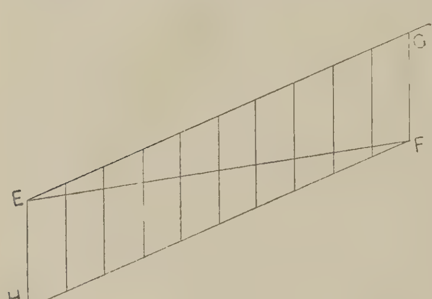


Fig. 2—Another Common Method.

It is clear enough that both of these methods are too long to be used frequently; and, moreover, their accuracy is not practically sure, for although it is true that theoretically they are both absolutely correct, yet in practice a line drawn even a little either to the right or the left of the exact point will cause the divisions to be unequal. As a fact, most draftsmen abandon these processes and prefer to divide up a line by trial—that is, they guess the distance required and step with the dividers backward and forward along the line, altering the distance as may be required until the line is divided up as wished. When the number of parts is an equal one—say, eight—this method is a quick one, for the line may first be divided into two parts, then each of these divisions into two and then each of the four divisions into two again. Neither of these methods, however, are to be much recommended, the objection being in each case the length of time required to execute them.

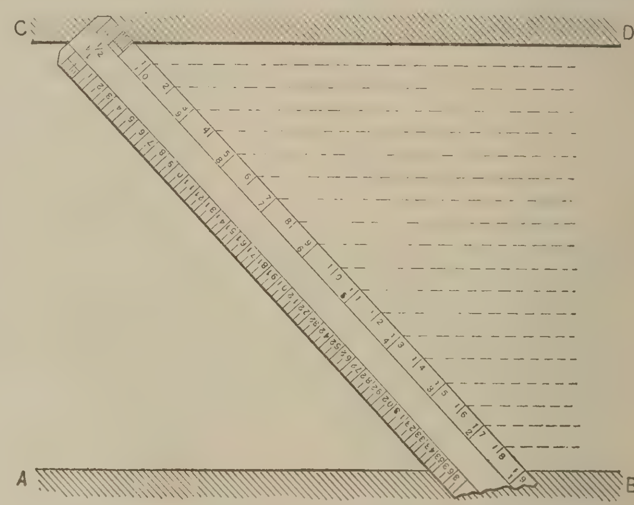


Fig. 3.—Dividing a Line by the Use of the Universal Scale.

Probably the quickest method of dividing up a space and at the same time the most accurate is by means of a common scale, preferably of the description known as the "universal" scale—that is, a rule having several scales marked upon it. A common pocket rule will answer the same purpose. To illustrate the use by means of an example. Suppose A, B, C, D, Fig. 3, represent respectively the first and second floor lines of a house in section, and that the dotted line represents the space to be given to the stairs. Suppose, further, that it has been calculated that there will be 19 risers required. It is desired therefore to divide the distance between A B and C D into 19 equal parts. Instead of stepping back and forth with the dividers, losing time and spoiling the paper, take the rule or any convenient scale and lay it across the lines at an angle, and with the zero point on C D and the point marked 19, or A B. Now mark a point at each of the divisions with a pencil, and the space is practically divided up as required, it being only necessary to draw lines through the points as represented by the dotted lines, and as will be understood from the sketch. In setting out the treads the same plan may be adopted, only that, of course, the position of the rule will be reversed. The same method may be used in a variety of cases, and, after a little practice in the selection of a suitable scale, far quicker than either of the usual methods, as already referred to.

To take another example: Let E, F, G, I, Fig. 4, represent the two vertical sides of a house, between which it is required to set out vertical poles, which are to be of two different distances apart. Having set off the horizontal rails, place a pocket-rule or scale across the space and mark off the points, omitting one where the wide spaces come. Then draw upright lines through these spaces, and the poles are set off as required and as represented on the right hand of Fig. 4.

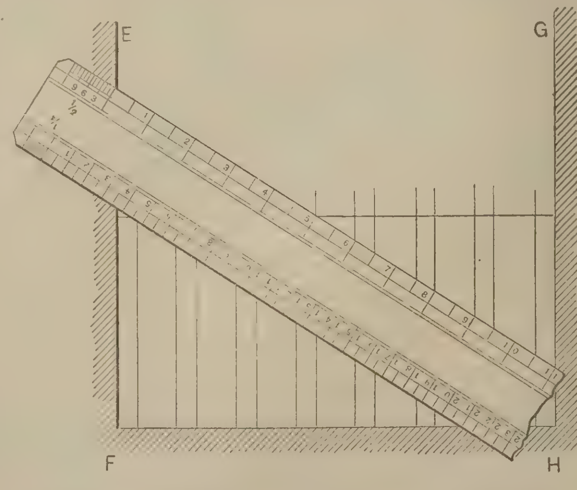


Fig. 4.—Constructing an Elevation by the Method Last Explained.

From the Pennsylvania slate regions we learn that the fall trade in roofing slate has been exceedingly brisk, and a larger output has been made than for many years past. Comparatively few slate remain on the banks to be carried over the winter. This, according to the Slatington *News*, is not only gratifying to the operators, but is an indication that work will be vigorously prosecuted during the next few months, in order to stock up for the early spring trade. The working hours in a number of quarries have been slightly reduced, but no suspension is anticipated during January. Our contemporary asserts that the slate trade in all its branches is on a better basis than it has ever been before, and prophecies that the output will increase year by year as long as the country remains in its present prosperous condition. Information from the Vermont and New York quarries is to the effect that a pool has been formed to control prices for the year.

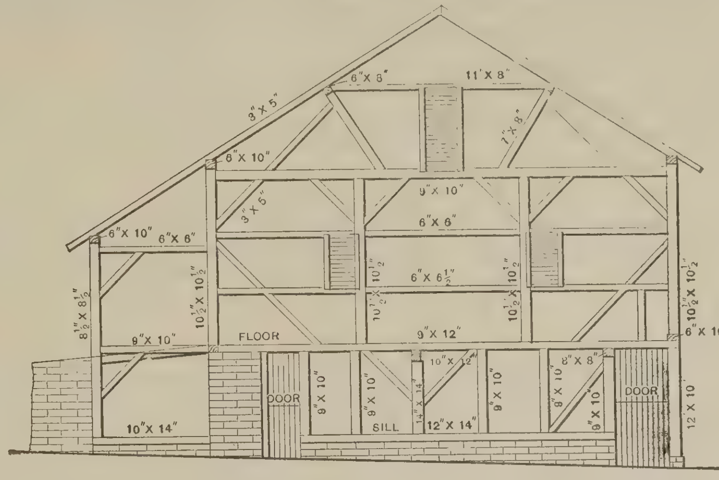
CORRESPONDENCE.

Lath or Laths.

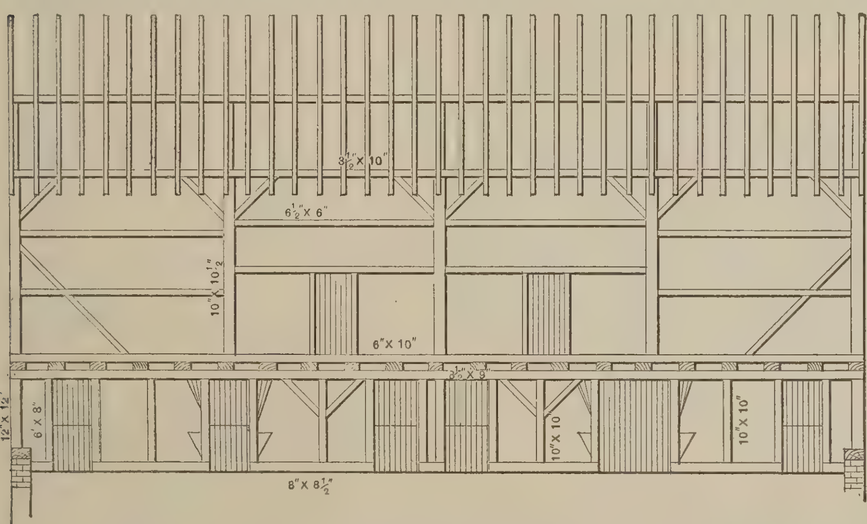
From ARTUS, *New York*.—In a recent issue of your journal I observe an extract from the *Northwestern Lumberman*, in which it asks whether "lath" or "laths" is correct for the plural of lath. Your contemporary tells us that while Webster has decided on "laths," yet words are as usage makes them, and suggests that by the same rule "corn" should be "corns" and "trout" "trouts," and so, I suppose, "sheep" should be "sheeps" and "deer" "deers." Let me ask which is correct for the plural "sash" or "sashes?" Taking the ground of the *Lumberman*, the former; for undoubtedly a large majority of the people in this section of the country so designate them. It is very probably correct that words are as usage makes them, but I doubt very much whether that means usage in any particular locality. Because then a large majority of the English speaking people say "laths" and "sashes" I shall take the liberty of differing with your contemporary and suppose those forms to be correct.

Barn Framing.

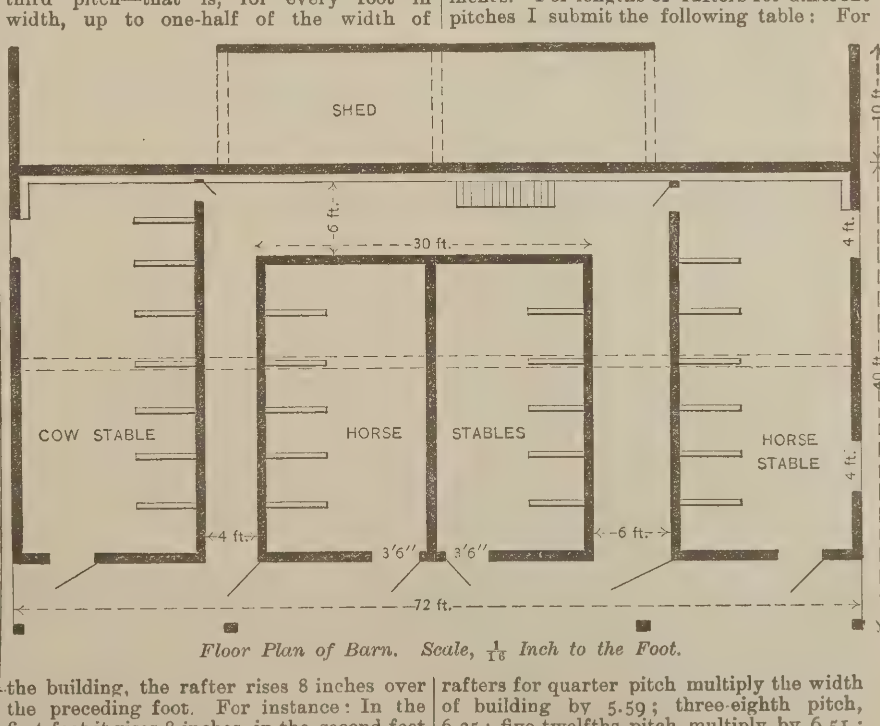
From F. W., *Danville, Pa.*—I inclose a drawing of a barn such as is built in this neighborhood. The barn is 40 x 72 feet, with 26 feet post, and having a shed back of it. The latter is 10 feet wide by 72 feet long. The posts extend to meet the slant of the roof of the barn. The frame is of oak, no pine being used except for the doors. The frame is all marked on the drawings, and will be clearly understood by the readers of *Carpentry and Building*. The cost of the building was $2000. It was raised with the assistance of 160 men, of course less would have served the purpose.



Cross Section, with Dimensions of Timbers. Scale, $\frac{1}{16}$ Inch to the Foot.



Barn Construction.—Longitudinal Section, Showing Rafters. Scale, $\frac{1}{16}$ Inch to the Foot.



Floor Plan of Barn. Scale, $\frac{1}{16}$ Inch to the Foot.

Construction of Stairs.

From W. G., *Merford*.—Replying to your Cookport correspondent, I would say use short baluster on landing.

Mixture for Blackboards.

From W. G., *Merford*.—Replying to the inquiry from your Oregon correspondent, I recommend the following as a mixture for blackboards on plaster walls: Mix common lampblack with the best rye in order to dissolve. Then mix with putty of plaster-of-paris and lime putty. A board made in this way will never rub off.

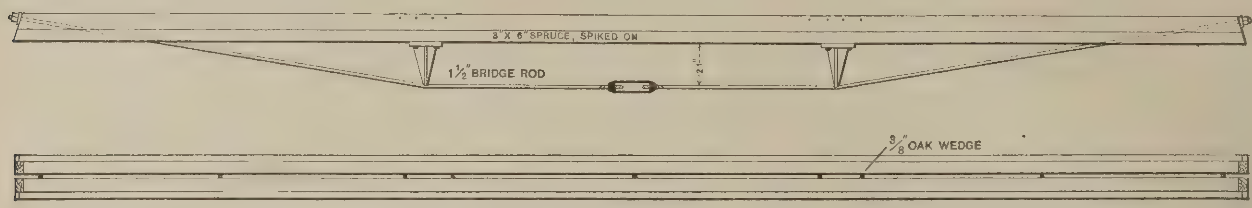
Length of Rafters.

From OCTAGON, *South Bend, Ind.*—I believe it to be a fact that not one out of five carpenters is familiar with square root. Then why not go a little further than "G. J" goes, and make square root so plain that the most ignorant mechanic will be able to comprehend it as applied to cutting rafters. For example, instead of squaring nine and six and adding the squares together and extracting the root of the sum, let us take the carpenter's square and a pocket rule and with them alone obtain the result. It is only necessary to remember to measure from the plumb-line on the rafter where it strikes the blade. That is, the point to measure from is where the line crosses the top of the rafter. On the square eight and twelve cut one-third pitch—that is, for every foot in width, up to one-half of the width of the building, the rafter rises 8 inches over the preceding foot. For instance: In the first foot it rises 8 inches, in the second foot 16 inches, in the third foot 24 inches, and so on up to 9 feet, where it rises 9×8, or 72 inches, equal to 6 feet. We will take a pocket rule and measure from the point on the square marked 9 across the angle to the point marked 6. By this we have the same result as though we extracted the square root, as above explained. It is necessary to remember in choosing the square in this way that 1 inch stands for 1 foot, ½ inch would equal 6 inches, ¼ inch would equal 3 inches, ⅛ inch would be ½ inch, $\frac{1}{16}$ inch would be ¾ inch, and $\frac{1}{32}$ would equal ⅜, and so on down to as fine a point as the mechanic has the mind to go. This general rule holds good for any pitch. By actual measurement from the figures 6 and 9, as above described, we find the length to be $10\frac{13}{16}$ inches, or, interpreted as above explained, equal to 10 feet 9¾ inches, the length of the rafter. Multiply half the width of the building by the rise to the foot in inches, and measure as above described.

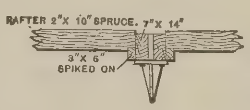
From A. D., *Glenwood, Iowa*.—In a recent issue of *Carpentry and Building* a correspondent gives the following as a rule for finding the length of rafters for a one-third pitch roof—namely, multiply the width of the building by six, and cut off the right-hand figure for inches. The rule in question would be more nearly exact if the result read in feet and tenths of a foot instead of feet and inches or twelfths of a foot. Multiplying the tenths by 12, reduces it to inches. For example: Suppose the width of a building is 16 feet, multiplying by six and pointing off one figure gives 9 6 feet. Reducing the $\frac{6}{10}$ foot to inches we have 9 feet $7\frac{1}{5}$ inches. For lengths of rafters for different pitches I submit the following table: For rafters for quarter pitch multiply the width of building by 5.59; three-eighth pitch, 6.35; five-twelfths pitch multiply by 6.51; for half pitch multiply by 7 07.

Roof Truss.

From J. D., *Holyoke, Mass.*—I have charge of the erection of a building to be used as a hall. The roof surface is 50 feet 6 inches by 84 feet, and is to be covered with tin. There is a rise of ½ inch to the foot. The roof is supported by five trusses, which are 52 feet long, and composed of two pieces of Southern pine 7 x 14 inches, with tapering wedges or separators between them. The pieces are bolted together with 30 bolts ¾ inch in diameter. A piece of spruce 3 x 6 inches is spiked on to each side of the truss to form a shoulder for the rafters to rest upon. The rafters are 2 x 10 inches, set 20 inches between the centers. The boarding is ⅞ inch spruce. The ceiling joists are 2 x 5 inches, set 16 inches between centers, and are hung at the rafters. The truss rods are 1½ inches in diameter except at the ends, and in the center or turn-buckles where they are 1¾ inches in diameter. There are six welds in each truss rod, and some of them look to be very poor. The question that I desire to ask is, Are the rods large enough to support the truss and roof, taking into consideration the quantity of snow that is liable to accumulate thereon during the winter? The roof is now on and the rods are supporting it.



Roof Truss.—Drawings Accompanying Letter from J. D

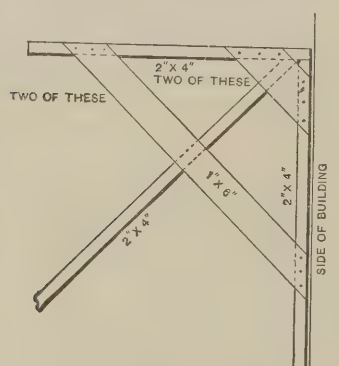


Cross Section Through Truss.

Note.—Thinking that a sample of construction, which is typical of much that is used in certain parts of the country, would interest our readers, we have published our correspondent's letter in full, and present herewith engravings made from the sketches which he inclosed. The roof would seem to be as flimsy as the designer dared make it. It may stand; but we should expect sagging, to say the least, when snow and ice are upon it. It is poor construction at the best, however considered; and the rods, which, by the description of our corrspondent, are called upon to do special duty, are evidently as inadequate as some other parts. Perhaps some of our readers will be glad to give this construction attention and to present their views for publication. We have written our correspondent privately what we think about it.

Staging Bracket.

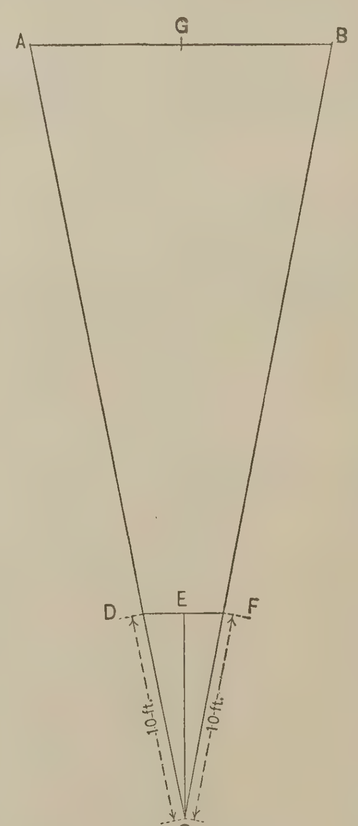
From W. L. N., *San Jacinto, Cal.*—I inclose a sketch of a staging bracket which I am using, and which is used by many contractors in this vicinity. It has the advantage of being simple in construction and is durable. The 5-foot piece resting against the building is supported by a 2 x 4 inch scantling running to the ground. By varying the angle of the supporting piece, the scaffold can be raised to any hight. This is possible without taking the scaffold down. The device shown is very convenient for brick buildings and requires no bolts or screws to hold it in place. I think the drawing is sufficiently explicit, as to need no further explanation. I would remark that the two diagonal braces are made double, being nailed to the outside of the vertical and horizontal pieces, and that the 2 x 4 inch support passes between them.



Staging Bracket.—Submitted by W. L. N.

Problem in Surveying.

From J. T. B., *Palmer, Mass.*—My solution of "T. H. S.'s" problem differs from any published in the December number. I have not written sooner because I wanted to see how others would get at the problem. I now send my solution for the benefit of those who are interested in the question. Referring to the accompanying sketch, let A and B represent the two stakes in the domain of A. B drives a stake as near midway as may be, as indicated by C, and then two others on line between C and A and C and B, as shown by *D* and *F*. These stakes are located 10 feet from C. He then bisects the angle at C, obtaining *E*.



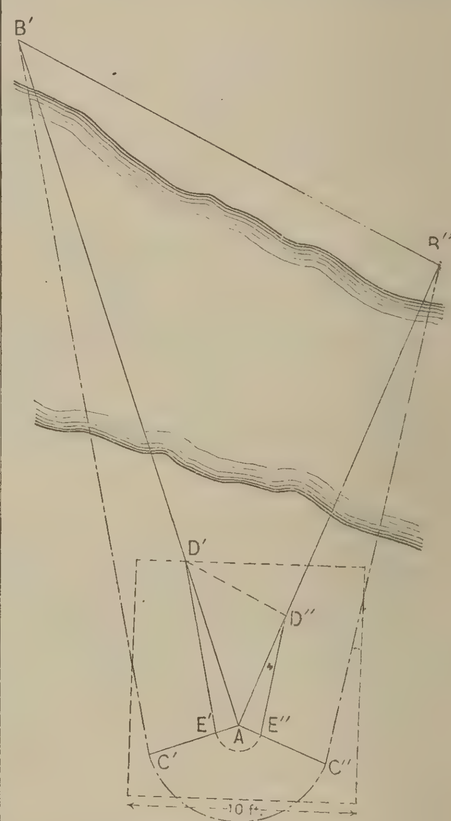
Problem in Surveying.—Solution Suggested by J. T. B.

Then as $CE : CF :: EF : \frac{1}{2} AB$ or GB.
And as $CE : CD :: ED : \frac{1}{2} AB$ or GA.
And as $EF : \frac{1}{2} AB$ or $GB :: CD : CA$.
$EF : GB :: CF : CB$.

Since the distances CD, CF, CE, DE and EF are known, it is a very simple matter to find the answers required by "T. H. S." The accuracy of this will depend on the nicety with which the stakes are driven, and the measurements, &c., made. If the distance is not very great, the answers will be very nearly correct.

From A. S., *Columbus, Ohio.*—I inclose a diagram in answer to "T. H. S.," whose surveying problem was given in the October number. Referring to the drawing, sight along rod from A to B′, make A C′ square with A B′. Sight along rod from any point C′ in A C′ to B′, make D′ E′ parallel to C′ B′. Repeat the same operation with A B″ making A′ C″=A C″ and A E″=A B′; join D′ D″.

As $AE' : AC' :: AD' : AB'$.
And as $AB' : AC' :: D'D'' : B'B''$.

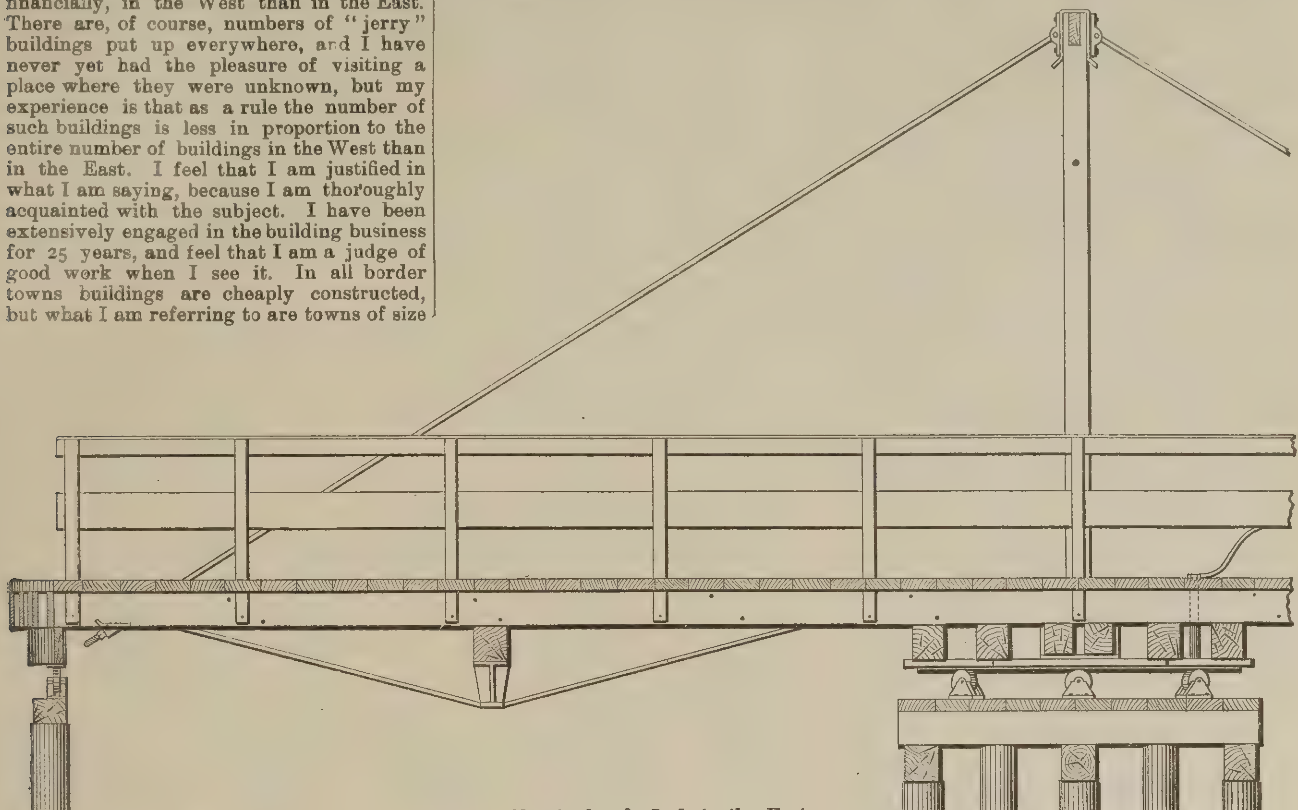


Solution Suggested by A. S.

Western Building.

From W. M., *Eaton, Ohio.*—In the September number of *Carpentry and Building* I notice a communication from "D. P. B.," of Lyons, Kan., in which he claims that building in the West is badly demoralized. I am not acquainted with the condition of the business in the vicinity of Lyons. It is possible that it may be just as your correspondent states; but, admitting this, he should not make his assertions so sweeping as to include all the West. I am well acquainted with a considerable portion of Kansas, Nebraska and Colorado, and I know that the condition of the building trade is better through the section of country named

than in most Eastern States, both in the quality of the buildings to be erected and the price received by the builder. As a rule, I believe that a builder can do better, financially, in the West than in the East. There are, of course, numbers of "jerry" buildings put up everywhere, and I have never yet had the pleasure of visiting a place where they were unknown, but my experience is that as a rule the number of such buildings is less in proportion to the entire number of buildings in the West than in the East. I feel that I am justified in what I am saying, because I am thoroughly acquainted with the subject. I have been extensively engaged in the building business for 25 years, and feel that I am a judge of good work when I see it. In all border towns buildings are cheaply constructed, but what I am referring to are towns of size

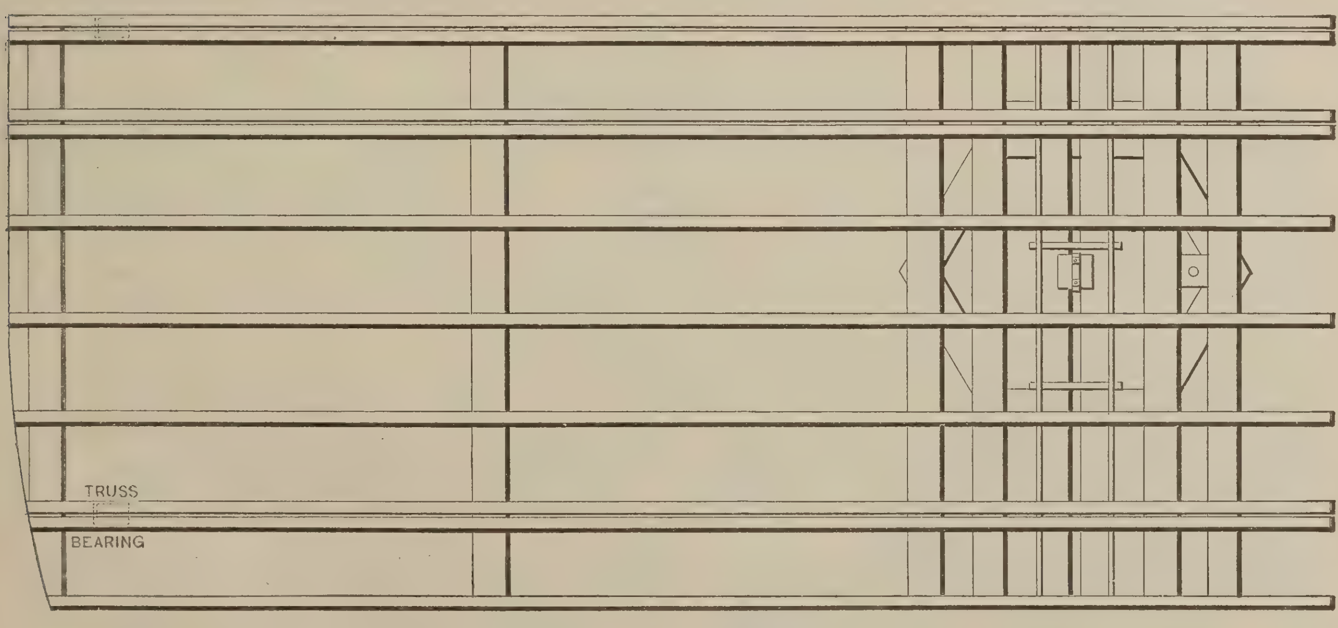


A Swing Bridge.—Contributed by B. E. Scale, $\frac{3}{16}$ Inch to the Foot.

enough to insure permanency and to justify owners in the expense required for substantial buildings.

Drawbridge.

From B. E., *Norfolk, Va.*—Inclosed I hand you a sketch of a drawbridge, which perhaps will interest some of the readers of *Carpentry and Building*. This bridge was built some time since to connect the city of Norfolk with one of the suburbs. It is the



Floor Section of Swing Bridge. Scale, $\frac{3}{16}$ Inch to the Foot.

only free bridge into the city; all the others, to the extent of six or eight, being toll bridges. The bridge in question was built through the influence of a very charitable lady. By reference to the sketch it will be noticed that it is a strong, light bridge; the absence of turnbuckles and sleeve nuts will also be observed. This, however, I think is a defect in the construction, for if the straining or truss rods should ever need to be disturbed it would cause considerable work to make the adjustment without these features. The timber of the bridge is good Georgia pine. To my way of thinking, the only weak point in the structure is the bearing across the top of the center pin. This is of cast iron. I shall be glad to have some of the practical readers of *Carpentry and Building* discuss this structure and point out any features in it that might be improved.

Expansion Joints.

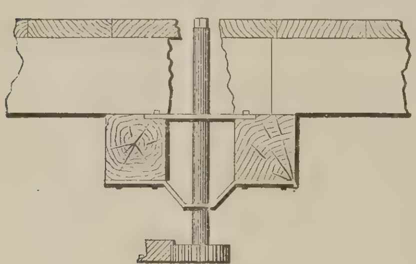
From H. H., *Chicago, Ill.*—In a recent issue, in discussing the question of gutters, reference was made to expansion joints, and the advice was given that in long lengths of gutter expansion joints should be used. Will you please explain what is meant by expansion joints under the conditions named?

Answer.—Any construction of metal which is calculated to nullify the action of contraction and expansion is commonly designated as an expansion joint. In other words, it is a joint made so loosely that, while being weather-proof, it allows a certain play of the metal, thus avoiding the extreme strain upon the material which follows where everything is fastened tight. The use of expansion joints recognizes in metal the constant changes which take place in length and breadth on account of changes of temperature. In other words, it allows the metal to expand and contract, according to circumstances. A standing seam in a tin roof, when made in the proper way, is a good example of a contraction and expansion joint. If made more loosely than is ordinarily the case, the special purpose in view would be better served. A double lock cross seam in a standing seam roof also has the properties of a contraction and expansion joint, to a certain extent. When it comes to gutters, the introduction of expansion joints is advocated so as to avoid the breakage which takes place in gutters where the metal is firmly fastened. The best construction would have such a

joint both at the edge against the cornice and also at the back under the slate or shingles. In the same manner the end of the gutter at the highest point would be provided with a similar joint as between the gutter and the cornice on the front. A double bead with one revolution of the metal hooked into the other is sometimes employed. Under the slate various methods are at the service of the roofer. Sometimes the edge of the metal is left free without any fastening whatever. In other cases, a reverse bend is made in the sheet into which are hooked cleats that are fastened by nailing. Still other methods will suggest themselves to the intelligent roofer, the object being simply to leave the metal free to come and go under changes of temperature, and at the same time make it weather-proof. Gutters should be constructed in short runs, and at each high point instead of firmly joining two runs together an expansion and contraction joint should be introduced crosswise of the gutter. An arrangment of beads similar to that suggested for the front of the gutter is available for this purpose, or a standing seam is sometimes employed. In other cases a wooden bead is put in place against the sides of which the two stretches of gutter end by upturning flanges. These are covered by a separate cap, the parts not being fastened together but being left in the nature of a slip joint. We have not by any means exhausted the plans that may be employed for accomplishing the end in view, but have said enough to answer our correspondent's query. If any of our correspondents see fit to take up the subject, we shall be glad to have them do so.

Smoky Chimneys.

From T. L., *Gladstone, Mich.*—I have built many chimneys in England, and have never had any trouble with down draft. I have always endeavored to construct the chimney so that the area of the shaft is



A Swing Bridge.—Detail of Gearing.

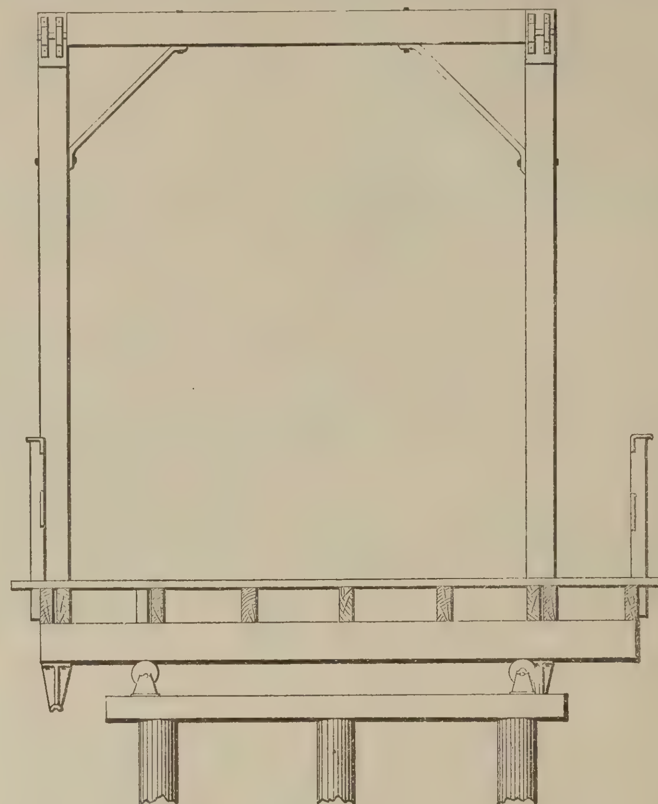
greater than the open space in the fire grate, and to finish the chimney at the top smaller. The greater difference you make at these three sections of your chimney the greater draft you will get. Say, for instance, the opening, after the grate is fixed, at the fireplace is 12 x 12 and the area of your chimney shaft 14 x 14, and a common 9-inch round pipe built in the top of your chimney and to project above the brickwork 4 inches will insure a steady draft. The volume of heated air and smoke in the shaft of the chimney will prevent any down draft. I have put in chimneys of this kind where trees have been overhanging the top of the chimney. The landlord would not allow the trees to be lopped, so I put in a large chimney shaft and a 6-inch common pipe on the top, which sent the smoke into the middle of the trees, and was not troubled with any down draft, no matter which way nor how hard the wind blew.

Wheel Problem.

From W. C. T., *Inglewood, Ontario.*—I wish to submit to the readers of *Carpentry and Building* a problem which I have no doubt some of them will easily solve, while others will find it interesting, and the practice will be beneficial to all. The problem is this: Suppose a wheel is 4 feet high and standing up 1 inch out of plumb, the wheel to be run around on the ground at the angle given. How many revolutions will it make before returning to the point it started from?

Finishing Walls.

From G. W., *Knoxville, Tenn.*—A correspondent in the August issue of *Carpentry and Building* asks if a good job can be made by using flooring covered with cloth and

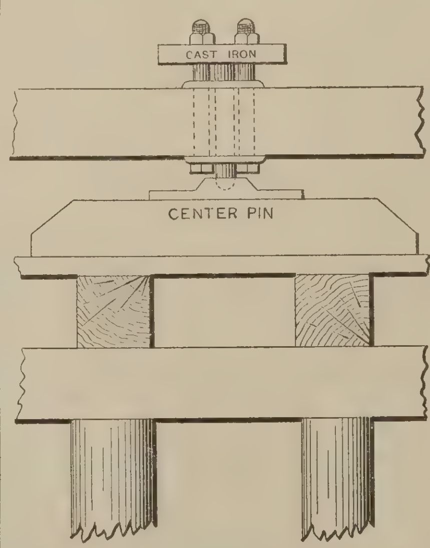


Cross Section. Scale, $\frac{3}{16}$ Inch to the Foot.

finished with paper in side walls and ceilings, instead of plastering. My answer is, No. I have had some experience with walls of this kind. When ceiling stuff or flooring

Cross Truss Over Center Pin.

is used or rough boards, as is the New Orleans way of building cheap "box" houses, the paper will always crack if the cloth is pasted on, owing to the shrinkage of the



Detail of Center Pin.

material. If tacked on, the work has a flappy or baggy appearance. My plan is to put up studding just as in the case of a plastered wall. Then lath the wall, leaving the space of a lath between, excepting where the back of a chair will strike the wall. There I put laths close together. I put on the cloth in the same manner as wall paper is applied, pasting the back thoroughly and rubbing well on. This method requires no stretching. When it dries it is as tight as a drum. The lath being narrow, there is no perceptible shrinkage, and, consequently, no cracking of the paper. As with the plastered wall so with this kind of a wall, the better seasoned the lath the better the work. This method makes a better, as well as cheaper, wall than using ceiling lumber. To avoid the inside walls being translucent, in the case of lamplight at night, I tack on one side of the studding before nailing the lath in place some cheap heavy paper; this also acts as a non-conductor of sound. It is better to put the cloth on before the inside finish goes up, the same as if plastering to grounds.

Cooling Upper Rooms.

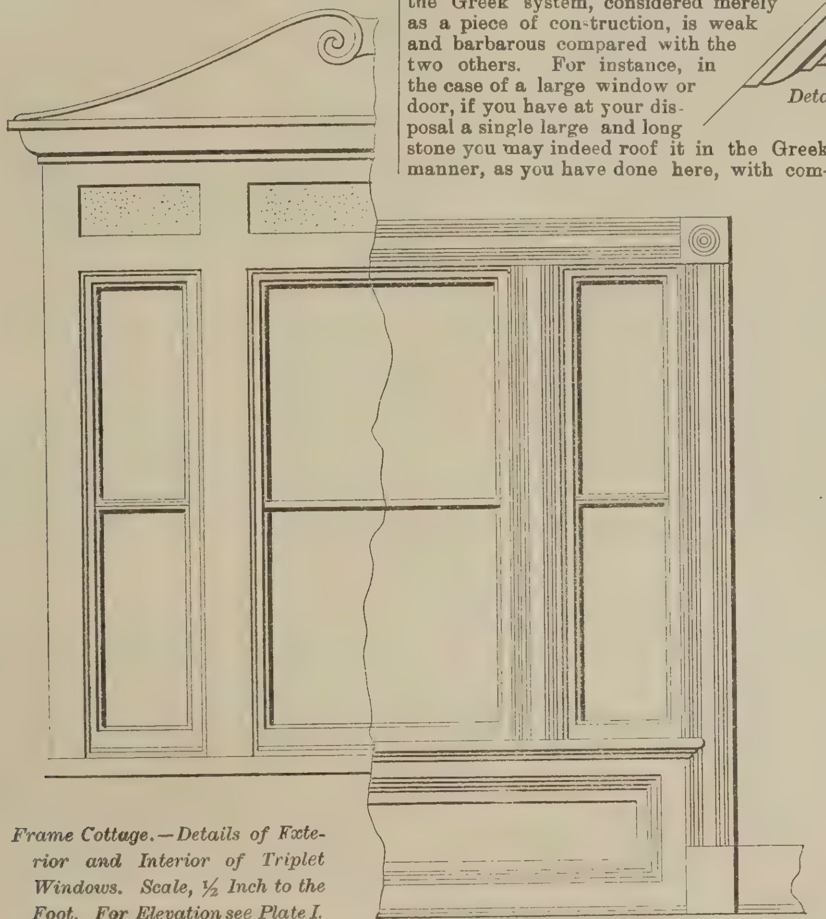
From O. O. F., *Kokomo, Ind.*—We have a frame house 1½ stories in hight. The upper rooms are very warm in summer. I desire to ask if we were to nail 2-inch strips over the shingles and on the strips lay sheetings, and then cover with tin or iron roofing, if this would have the effect of cooling the upper rooms?

Answer.—What our correspondent proposes to do will, no doubt, be of some benefit, provided he arranges the work in a way to secure a circulation of air between the two roofs. There would be the necessity of ridge ventilators and having the space between the two roofs open at the eaves. The small distance between the two roofs, as he explains, 2 inches, might not afford as much relief as may be desired. However, he is working in the right direction If there be an attic space between the ceiling of the upper rooms and the roof at present, it is possible that he can secure the same results by proper ventilation as would be obtained by adding the extra roof.

Frame Cottage.

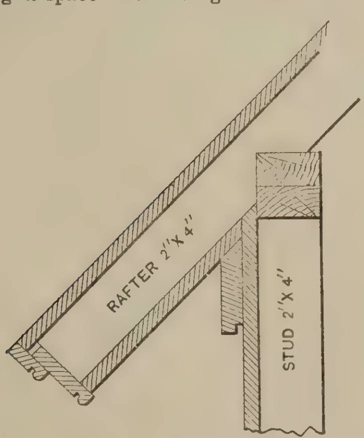
The elevations, plans in Plate I and details on this and the following page represent a cottage designed by S. W. Shepard, 380 Broad street, Knoxville, Tenn. The house is estimated to cost about $1500. The foundations are to be of brick or stone, and the framework, which is intended to be of the usual character, is to be sheeted on the outside. The drawings show the features of the design so thoroughly that further particulars are scarcely demanded.

JOHN RUSKIN, in discussing the lintel in architecture, says: " The principal distinctions between existing styles of architecture



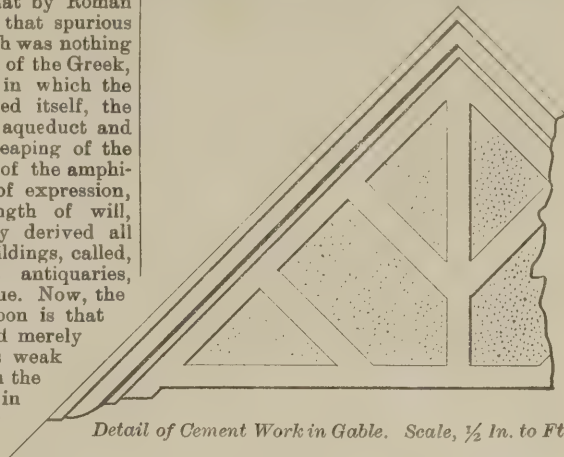
Frame Cottage.—Details of Exterior and Interior of Triplet Windows. Scale, ½ Inch to the Foot. For Elevation see Plate I.

depend on their methods of roofing any space, as a window or door for instance, or a space between pillars—that is to say, that the character of Greek architecture, and of all that is derived from it, depends on its roofing a space with a single stone laid from



Section of Cornice. Scale, 1 Inch to the Foot.

side to side; the character of Roman architecture, and of all derived from it, depends on its roofing spaces with round arches; and the character of Gothic architecture depends on its roofing spaces with pointed arches or gables. I need not, of course, in any way follow out for you the mode in which the Greek system of architecture is derived from the horizontal lintel; but I ought perhaps to explain that by Roman architecture I do not mean that spurious condition of temple form which was nothing more than a luscious imitation of the Greek, but I mean that architecture in which the Roman spirit truly manifested itself, the magnificent vaultings of the aqueduct and the bath, and the colossal heaping of the rough stones in the arches of the amphitheater; an architecture full of expression, of gigantic power and strength of will, and from which are directly derived all our most impressive early buildings, called, as you know, by various antiquaries, Saxon, Norman, or Romanesque. Now, the first point I wish to insist upon is that the Greek system, considered merely as a piece of construction, is weak and barbarous compared with the two others. For instance, in the case of a large window or door, if you have at your disposal a single large and long stone you may indeed roof it in the Greek manner, as you have done here, with comparative security; but it is always expensive to obtain and to raise to their place stones of this large size, and in many places nearly impossible to obtain them at all, and if you have not such stones, and still insist upon roofing the space in the Greek way—that is to say, upon having a square window, you must do it by a miserably feeble adjustment of bricks. You are well aware, of course, that this latter is the usual way in which such windows are now built in England; you are fortunate enough here in the north to be able to obtain single stones, and this circumstance alone gives a considerable degree of grandeur to your buildings. But in all cases, and however built you cannot but see in a moment that this cross-bar is weak and imperfect. It may be strong enough for all immediate intents and purposes, but it is not so strong as it might be; however well the house is built, it will not stand so long as if it had been better constructed, and there is hardly



Detail of Cement Work in Gable. Scale, ½ In. to Ft.

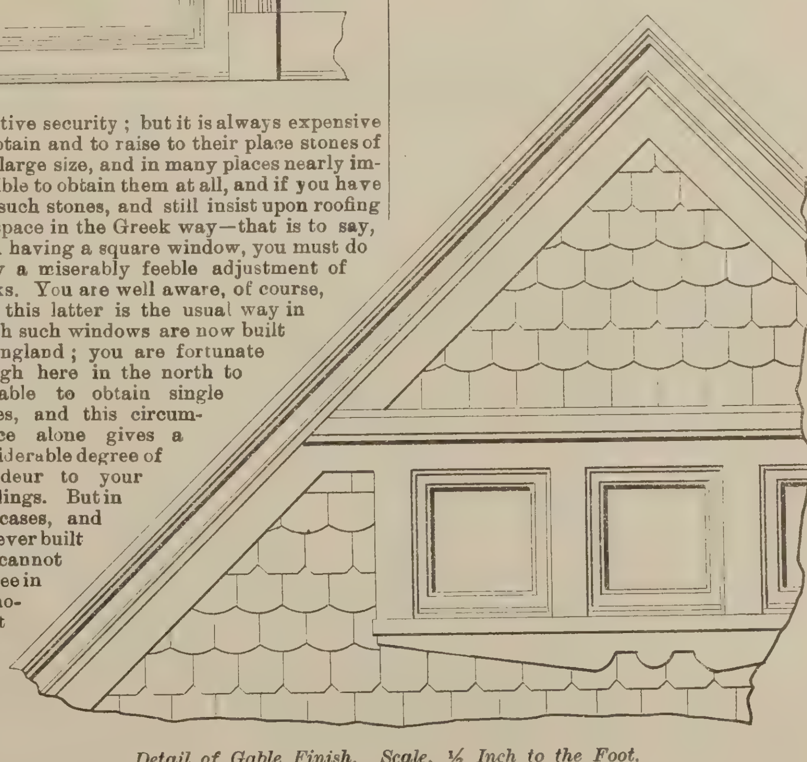
a day passes but you may see some rent or flaw in bad buildings of this kind."

A House for Three Families.

Some time since we published in these columns a design for a house prepared by Charles E. Hebberd, No. 62 Broad street, New York, intended to accomodate two families. The arrangement of the rooms was similar to that of an apartment or flat house; and yet the front of the building was not unlike that of an ordinary dwelling. Houses to accommodate two or more families, and yet present the appearance of ordinary dwellings from the out side, are in demand in all the large cities. This gives interest to the design presented in Plate III, from the same architect, and which represents an apartment house arranged for three families. The

Base Board.

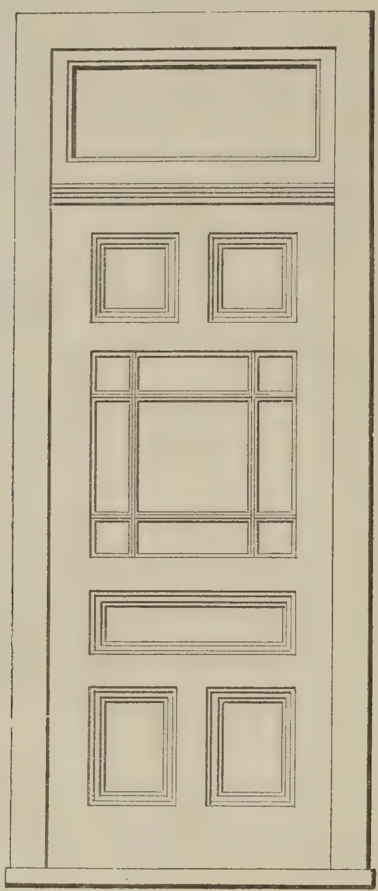
building in question was erected a short time since in the upper part of New York City on a 25-foot corner lot. The design is of a character to give grace and dignity to almost any prominent corner in any of the numerous towns and villages where such a building is required. The blank party-wall admits of duplicating the plans on the opposite



Detail of Gable Finish. Scale, ½ Inch to the Foot.

side, in case a double house is desired. The arrangement of the rooms on all of the different floors is about the same. The two upper floors gain an additional room over the

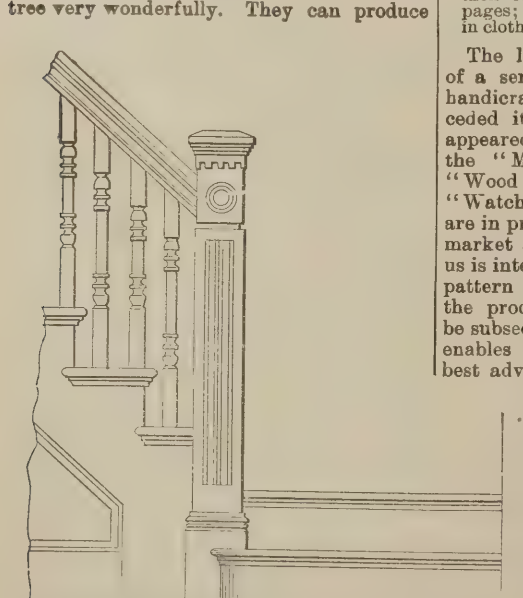
vestibule. A dumb-waiter runs from cellar to attic, thus affording communication with delivery men, &c., from the basement to each of the floors. Each apartment has its bathroom and plumbing arrangements. The balcony on the side and front forms a pleasing addition to several of the principal rooms.



Frame Cottage.—Detail of Front Door. Scale, ½ Inch to the Foot.

The Bamboo Tree.

Writing from China, a correspondent of the *Lumber World* says that the Chinese have developed the culture of the bamboo tree very wonderfully. They can produce a perfectly black as well as a yellow bamboo. The emperor of China has one officer whose duty is to look after his bamboo gardens. This valuable tree is found in all tropical and subtropical regions, both in the eastern and western hemispheres. An attempt has been made in England, and with some success, to raise a dwarf species found at an altitude of 12,000 feet in the Himalaya Mountains. The New World furnishes bamboo of the greatest diameter. The stems are usually very slender, but in the northwestern part of South America is found one species with a diameter of 16 inches. The Chinese put this plant to a greater variety of uses than any other people. Some kinds of it when it first shoots up from the ground are used as a vegetable as we use asparagus, or it can be pickled in vinegar or made into delicious sweetmeats. The plant has to be 30 years old to blossom, and then it bears a great profusion of seeds and dyes. These seeds may be used like rice, and a kind of beer may be made from them. In 1812 severe famine in portions of China was prevented by the sudden blossoming of a great number of bamboo trees. The stems of all the varieties are remarkably salicaceous. One kind found in Java is so hard that it strikes fire when the hatchet is applied to it. This has only a very slender stem, which is polished and used as stems for tobacco pipes. This protean tree furnishes material for houses, boats, cordage, sails of boats, telescopes, aqueduct pipes, water-proof thatching, clothing, water-wheels, fences, chairs, tables, bookcases, boxes, hats, umbrellas, shields, spears and paper. The pith is used for lamp-wicks, so there is no part of it that cannot be used for something. From some of it exquisite carvings inlaid with gold and silver are cut, that exceed in beauty the ivory carvings for which the Chinese are so famed. Recently it has been put to another use. Mr. Edison has found that the carbonized fibers of the bamboo furnish the best material for the incandescent electric lamp and has made use of it in his system of lighting. In Burmah and Siam whole cities are built from bamboo. These houses are made in pieces, lashed together, and raised on posts several feet high.

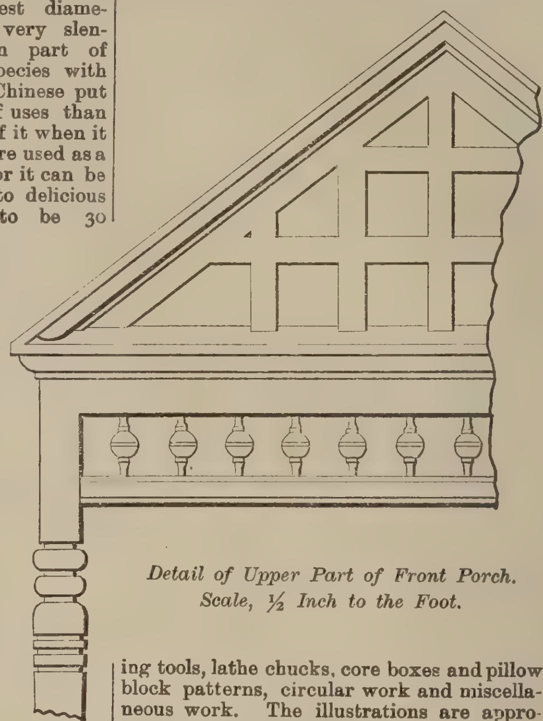


Detail of Main Staircase. Scale, ½ Inch to the Foot.

NEW PUBLICATIONS.

PATTERN MAKER'S HANDY BOOK. A practical manual for founders, embracing information on the tools, materials and appliances employed in their constructions. By Paul N. Hasluck. 144 pages; 5 x ½ inches; 107 engravings. Bound in cloth. London, Crosby, Lockwood & Son.

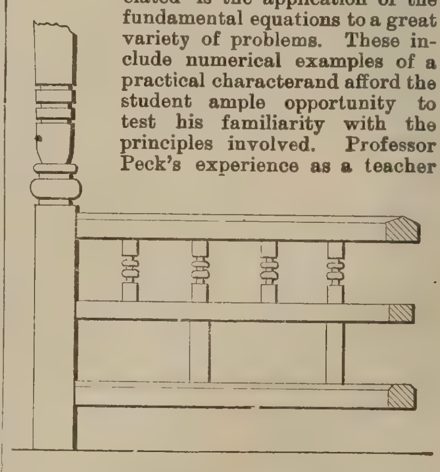
The little volume above described is one of a series by the same author relating to handicrafts. Among those which have preceded it, reviews of some of which have appeared in our columns, may be mentioned the "Metal Turner's Handy Book," the "Wood Turner's Handy Book," and the "Watch Jobber's Handy Book." Still others are in preparation and will be put upon the market at an early date. The work before us is intended to afford some information on pattern making, and also some insight of the processes to which the patterns are to be subsequently subjected. This knowledge enables a pattern maker to work to the best advantage. The literature of pattern making is scanty. The cause may be that this intricate art is one that cannot be brought under well-defined rules; it may be also that those who are well posted in pattern making have not the literary ability to formulate their ideas. Almost every new pattern requires some amount of independent thought upon the part of the artificer. The book under review is intended to be specially useful to the beginner. It contains a large amount of information, and in addition has a glossary of terms. Its contents are embraced in ten chapters, exclusive of the glossary already mentioned. The first of these is devoted to pattern making, in which the general nature of the art is explained. Following that is a chapter devoted to molding and founding, and then in succession occur chapters on appliances, hand tools, machine tools and drawing tools, lathe chucks, core boxes and pillow block patterns, circular work and miscellaneous work. The illustrations are appropriate, and have been chosen from a variety of sources. The book is of a character that cannot fail to interest many young mechanics who are studying in the direction named.



Detail of Upper Part of Front Porch. Scale, ½ Inch to the Foot.

ANALYTICAL MECHANICS. By Prof. William G. Peck. Size, 5 x 8 inches; 319 pages. Published by A. S. Barnes & Co. Price $1.40.

Among the various treatises on analytical mechanics Professor Peck's new book will undoubtedly take rank as one of the favorites. In many respects it will be found more elementary than the student has reason to anticipate, and the calculus, though used in numerous examples, is not made the predominant feature of the different processes of analysis. This fact becomes apparent on even a superficial examination, and betokens an evident desire on the part of the author to employ, wherever possible, the more elementary methods. One of the features which will be appreciated is the application of the fundamental equations to a great variety of problems. These include numerical examples of a practical character and afford the student ample opportunity to test his familiarity with the principles involved. Professor Peck's experience as a teacher has enabled him to give special study to the requirements of a text-book, and we have no doubt that as such his new work will prove eminently satisfactory. The matter was primarily prepared for use in the School of Mines, and the methods of demonstration have been thoroughly tested in the class-room.



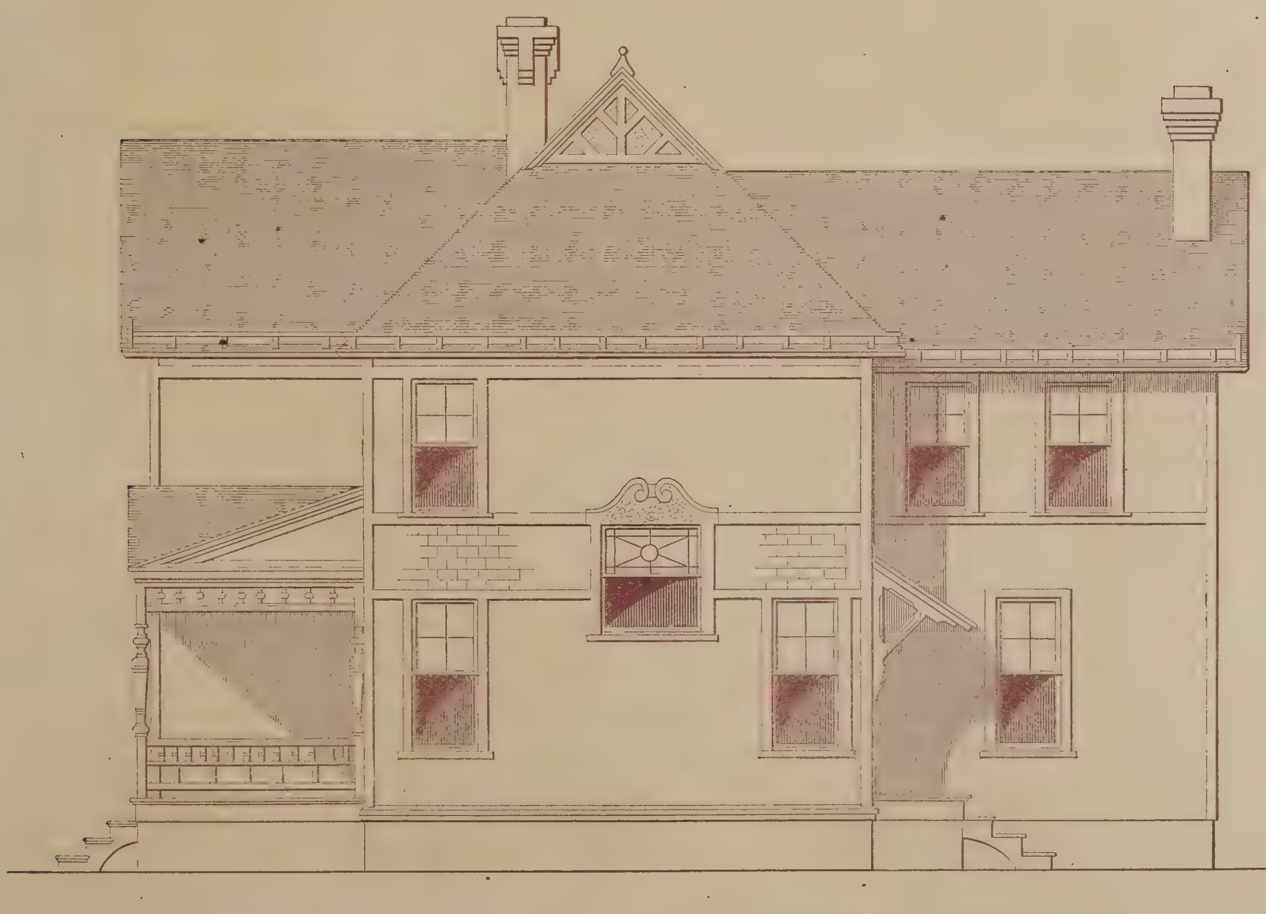
Detail of Balustrade. Scale, ½ Inch to the Foot.

Front Elevations and Plans of Frame Cottage.

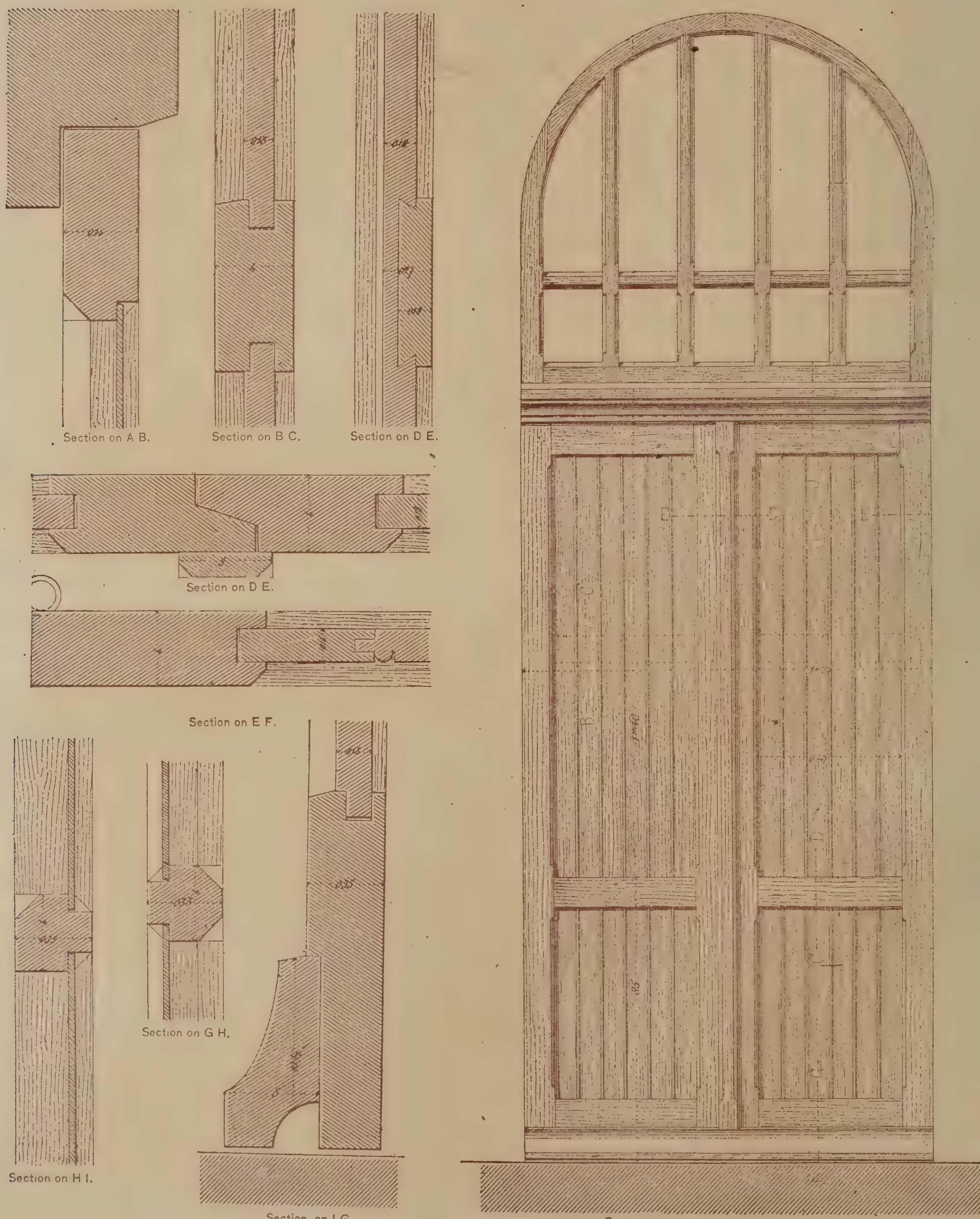
Designed by S. W. Shepard, Knoxville, Tenn.

Elevations, Scale 1-8 Inch to the Foot. Plans, 1-16 Inch to the Foot.

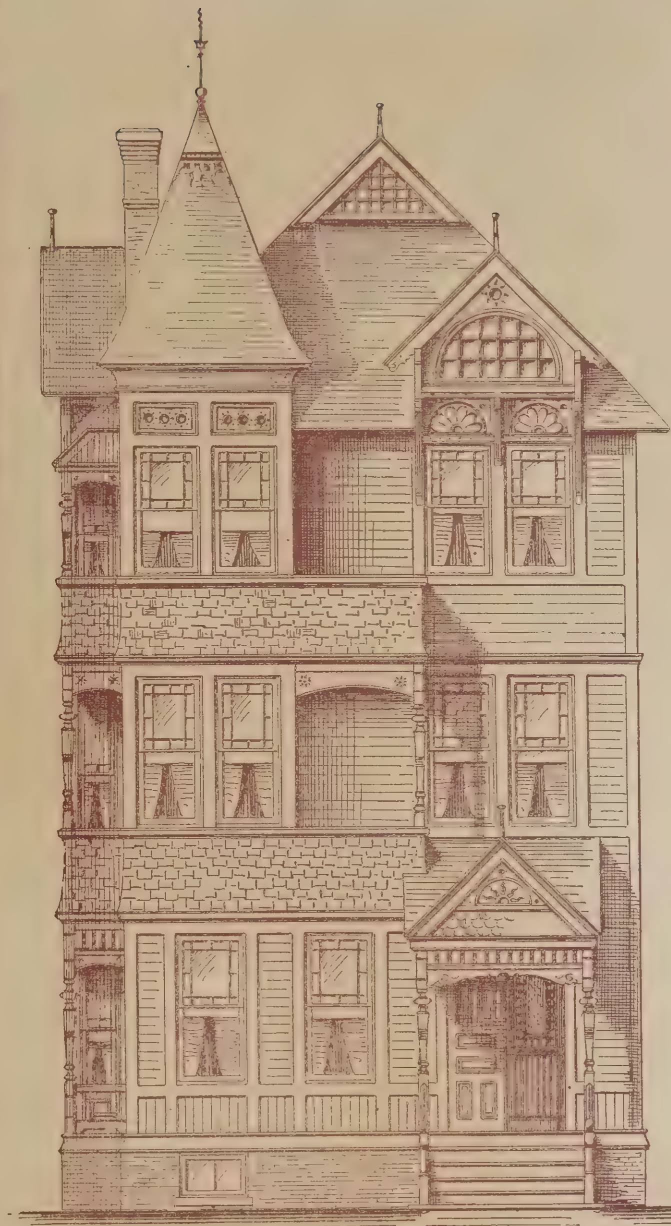
For Details, see preceding pages.



PARQUETRY FLOORS. DESIGNED BY R. FISCHINGER.



DOUBLE DOOR, WITH DETAILS OF CONSTRUCTION. DIMENSIONS IN METRIC SCALE.



Elevations and Floor Plans of a House for Three Families,

Designed by Charles E. Hebberd,

Scale of Elevation, 1-8 Inch to the Foot.

Scale of Floor Plans, 1-16 Inch to the Foot.

Interior View, Showing Sliding Blinds and Venetian Blinds.

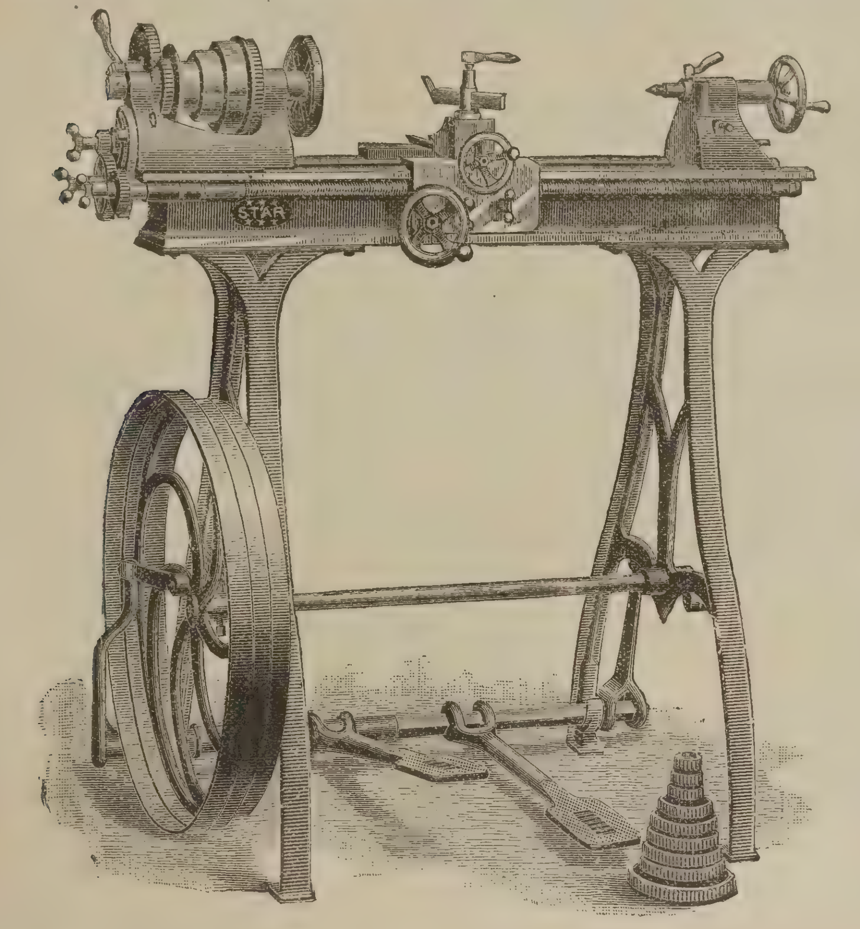
Wooden Mantel, Designed and Built by Hegan Brothers, Louisville, Ky.

Scale, 1-2 Inch to the Foot.

NOVELTIES.

Screw-Cutting Engine Lathe.

The Seneca Falls Mfg. Company, of Seneca Falls, N. Y., are introducing a new back-geared screw-cutting engine lathe with automatic cross feed known in the trade as the Star Lathe. It is illustrated in Fig. 1 of the engravings. It swings 9 inches on the face plate, 5½ inches over the tool carriage and there is a space of 25 inches between centers. It is put out as being a strong, solid and thoroughly well built machine. The head stock has a three-speed cone, using a 1¼-inch flat belt. The spindle is of steel, 1¼-inch, hollow, with a ⅜-inch hole. It runs in anti-friction metal lined boxes, which are adjustable for taking up the wear. The tail stock has an adjustable slide movement for turning tapers and a steel spindle with self-discharging center. The tool carriage is strongly gibbed to the bed. The rest has an automatic cross feed which will feed in or out, thus securing perfect accuracy in turning or facing up work. With the addition of some attachments a greater variety of molding can be done, a feature that will be appreciated by mechanics and amateurs generally. The tool carriage is provided with a friction feed which is thrown in or out of contact by turning a thumb nut. By simply turning a lever it will feed right or left, cut screws right or left, or it may be thrown out of gear entirely. Threads are cut from 3 to 64 inclusive, without compounding the gears, and any number of threads by compounding. The gears are cut from solid metal by automatic machinery, and are of a character to run smoothly. The bed is 7 inches wide, has four V-ways, and is heavy in proportion to the other parts of the machine. The foot power is of the kind peculiar to this company, and is asserted by the makers to be the most powerful ever used with a foot lathe. It consists of a double-treadle with a walking motion, embracing an entirely novel principle. The treadles are movable and work independent of each other, being connected at opposite ends of the drive-wheel shaft in such a manner as to produce a strong, positive and continuous power.



Novelties.—Fig. 1.—Star Screw-Cutting Engine Lathe. Built by the Seneca Falls Mfg. Company, Seneca Falls, N. Y.

Bardsley's Checking Spring Pivot or Hinge.

This article is put on the market by the Yale & Towne Mfg. Company, Stamford, Conn., and 62 Reade street, New York, who are the sole agents for its sale. The illustration, Fig. 2, is intended to represent this article as it is applied to the bottom of the door, there being another pivot on the top of the door, the door swinging on these pivots instead of hinges. The checking spring pivot or hinge shown in the illustration is let flush into the floor or sill beneath the door, its object being to furnish at once the hinge on which the door moves and the mechanism by which the door shall be automatically closed. It has a heavy iron frame which is covered by a brass plate which is in sight and flush with the floor, projections on the door or frame being thus entirely avoided. The working parts are made of steel, and the casing which contains the mechanism is filled with a lubricating fluid, thus insuring durability and smooth working. The liquid used is a non-freezing mixture, and, the casing being practically air-tight, there is little or no evaporation, and dust is excluded. As will be inferred from the illustration, opening the door compresses the spring, and in this way the requisite power is obtained for closing the door. In closing the door shuts quickly until it is three-fourths closed, at which point it cushions against the liquid and travels more slowly the rest of the distance, and stops in its proper position, thus preventing slamming, &c. The closing speed of the door is controlled by a regulating screw which is operated from the surface, this screw regulating the size of the aperature through which the fluid is forced. The point is made by the manufacturers that as there is only one spring used, as against four in a pair of ordinary double-acting spring hinges, and this spring is compressed and not twisted, the liability of breaking is reduced to a minimum, or indeed entirely overcome. The point is also made that the mechanism is so contrived that the greatest pressure of the spring is applied when the door is closed. It is also stated that there is absolutely no noise or violence in the operation of this device. Two sizes of this checking spring pivot are made: No. 1, suitable for doors up to 7 feet 6 inches x 2 feet 9 inches, and 1½ to 2 inches thick, and No. 2, suitable for doors up to 8 feet x 3 feet 6 inches, and 2 to 2½ inches thick. For outside doors exposed to high winds it is recommended that the larger size spring be used.

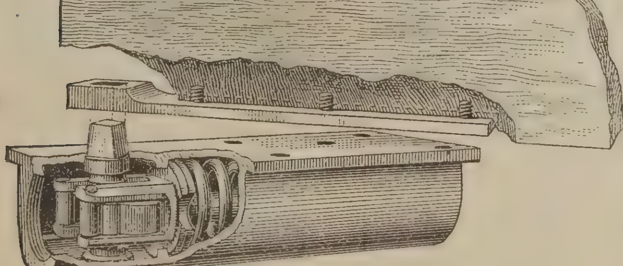


Fig. 2.—Bardsley's Checking Spring Pivot or Hinge.

Pencil Compass.

The Tower Mfg. Company, corner Broadway and Duane street, New York City, are directing the attention of draftsmen and users of lead pencils in general to a new device shown in Fig 3, which converts any lead pencil into a compass or an instrument for drawing circles or arcs of circles at a moment's notice. The engraving is full size and shows the features of the device so thoroughly that further description is scarcely necessary. Varying radii are provided by slipping the holder up and down on the pencil. The extreme limit is circles 8 inches in diameter. From the fact that we have had inquiries for something of this

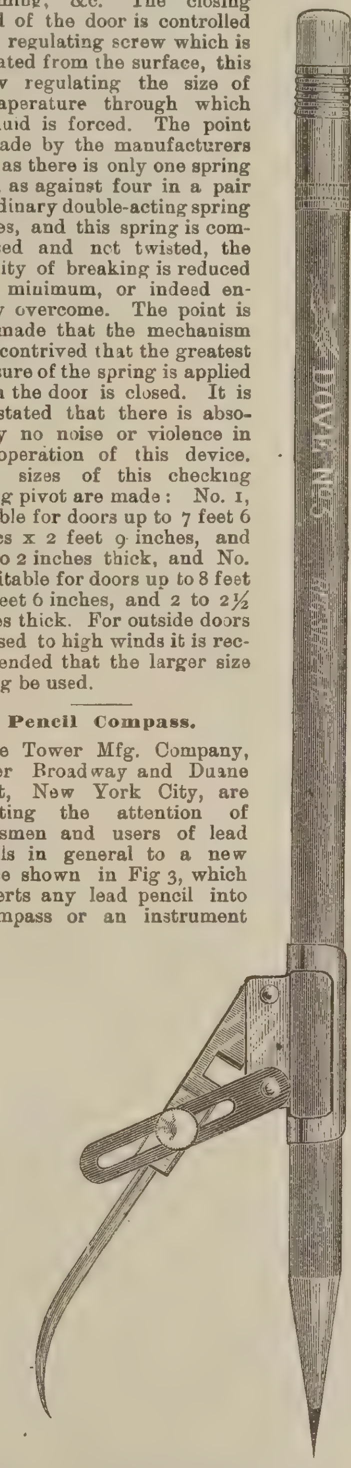
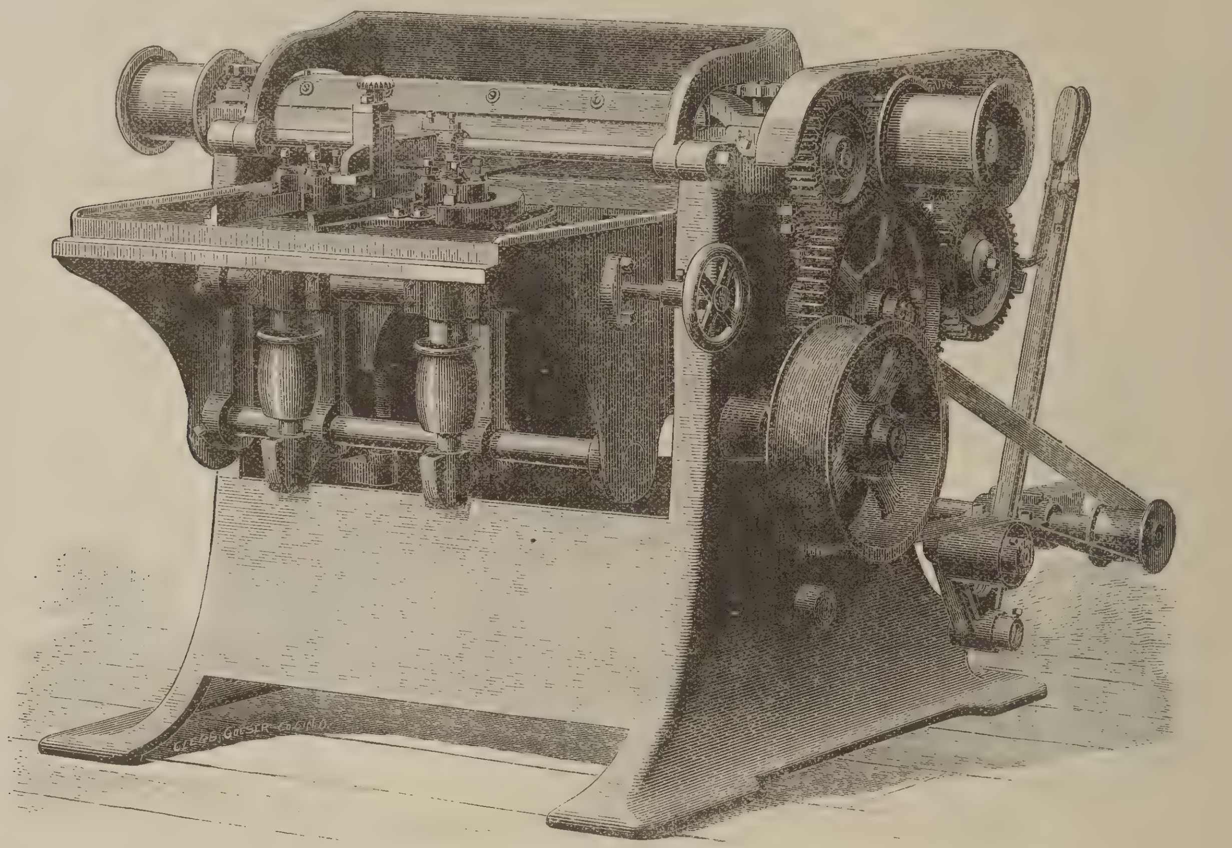


Fig. 3.—Compass Attachment for Lead Pencils.

kind in the past we are led to believe that what is here shown will find a ready demand among our readers. The peculiar curvature of the point fits around the whittled end of the pencil; accordingly there is nothing to prevent the article being carried in the pocket.

New Planing and Matching Machine.

Deitz, Woermann & Co., 58 & 60 Plum street, Cincinnati, Ohio, are introducing a new planing and matching machine shown in Fig. 4 of the engravings. The machine has a capacity of 26 inches wide and any thickness up to 7 inches It will tongue and groove any width up to 14 inches. The frame is cast in a single piece and is fitted into the frame on wrought iron gibs, so constructed as to be adjusted for taking up wear. The cylinder head is made of forged steel and is true and carefully balanced. The journals are 1⅝ inches in diameter, running in babbitted bearings 7 inches in length. No separate adjustment of rolls and cylinder is needed to change for different thicknesses of lumber. Changes are made by one movement of the handwheel, which raises or lowers the table and rolls, while the indicator on the side shows exactly to what thickness the machine is set. An improved pressure bar of great strength is placed on each side of the cylinder, thus insuring steadiness, even when planing short and thin stuff. The pressure bars are self-adjusting, always regulating themselves to the various sizes of thick and thin lumber. The rolls are 4 inches in diameter; the upper infeeding rolls are fluted. These are given an even pressure by weights. The machine is powerfully geared, insuring a steady and positive feed. The matcher heads move up and down with the table, therefore saving much trouble and expense in special adjustments. The matcher spindles are made of steel and the heads of gun metal, and are supplied with solid milled bits. An improved chip-breaker, fitted to the exact circle of the hight, which prevents the breaking out of defective lumber, is also supplied. The matcher heads can be entirely removed by simply loosening one set-screw on the side, leaving the table clear for planing the full width of the machine. A beader and molding attachment can be also supplied.



Novelties.—Fig. 4 —New Planing and Matching Machine. Built by Deitz, Woermann & Co., Cincinnati, Ohio.

Steel Pocket Rules.

The Lufkin Rule Company, Cleveland, Ohio, are putting on the market a line of folding pocket rules which are represented in the accompanying illustrations. These rules are made of spring steel and are described as bending to a 3-inch circle. They are made in 1, 2 and 3 foot lengths and in 3 and 4 inch joints, the gauge of the steel in all cases being 26 and the width of the rule ⅜ inch. Fig. 5 represents a 1 foot rule full size. Neat leather cases are also made for these rules, one of which, containing the rule shown in Fig. 5, is represented in Fig. 6, the rule being slightly drawn out from the case. These rules can be purchased either with or without cases as desired, as the rules and cases are sold separately. The rules with 3-inch joints are referred to as just the right length for the lower vest pocket and those with 4 inch joints as the most convenient for the upper vest pocket. These rules are well made and finished and will doubtless be appreciated by the trade. The company are also adding other steel rules to their manufactures: ¾ inch by 21 gauge, which is made without joints, in 1 and 2 foot lengths, and 1¼-inch by 18 gauge, also without joints, in 1, 2 and 3 foot lengths, with eighths on lower edge and sixteenths on upper edge, both sides.

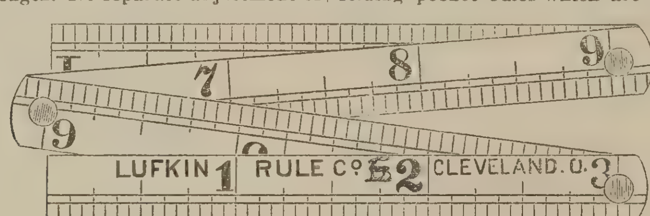


Fig. 5.—New Pocket Rule.

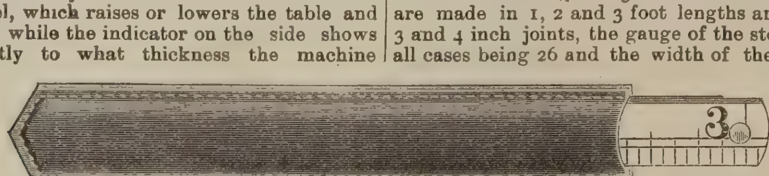


Fig. 6.—Case for Holding Pocket Rule.

Automatic Guest Call.

Figs. 7 and 8 of the engravings represent a device which is being put upon the market by the Harford Electrical Company, of East Saginaw, Mich. It is a combined clock and automatic guest call, intended for use in

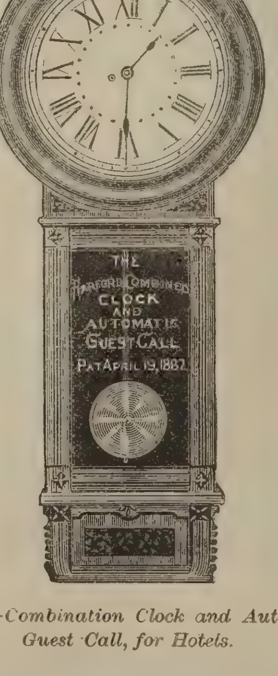
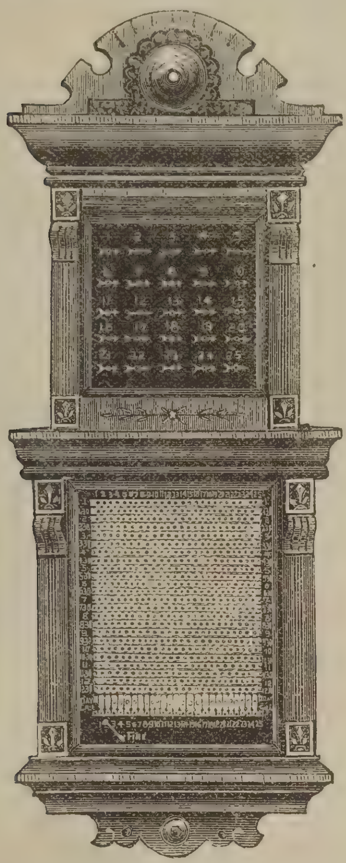


Fig. 7.—Combination Clock and Automatic Guest Call, for Hotels.

hotels, and being an assurance of safety in the event of fire breaking out. The system is also adapted for use, with certain mod-



Novelties.—Fig. 8.—General View of Switch Board and Indicators.

ifications, in private houses. The apparatus of the system consists of the usual office clock and electrical annunciator and a switch-board showing room numbers. These are placed in the office of the hotel. The switch-board, as is shown by Fig. 8, is mounted in cabinet-work of a character to make it an acceptable addition to the furnishing of any hotel office. It is compact, and any available wall space may be utilized. In each room of the hotel there is placed a common push button, and also an electrical bell. The batteries are located in the cellar or in a convenient closet. Referring to the cut of the switch-board and annunciator, it will be seen that the switch-board is arranged with a row of figures across the top, which represent the rooms and with hours of the morning commencing at 1.30 down the side. Each vertical row of holes then relates to a room, and each horizontal row to a period of time. For example, if a pin is put into the hole representing the intersection of the vertical row marked 5 and the horizontal row marked 5.30, it would mean that room 5 is to be called at 5.30. So much for the means to be employed by the clerk or person in attendance; further than this, the mechanism is automatic. Suppose, for example, several guests are to be called at 5 o'clock. All that it is necessary for the clerk to do is to insert pins in the room numbers on the switch board opposite 5 o'clock. Suppose other guests are to be called at 5.30, the pins are inserted in the respective room number of these guests opposite 5.30, and so on for such other calls as are desirable. Any number of rooms can be called at any or all of the whole or half hours, as may be desired. No further attendance need be given to the matter, for when the hour hand of the clock reaches 5 all the rooms switched on to that hour have their electric bells rung automatically. This ringing continues in each case until the guest arises and touches his push button; this has the effect of dropping the annunciator and indicating in the office that he has arisen. The clerk then removes the pin from the room number of the switch board, and thus stops the ringing, or he can leave it there, since the bell will cease to ring automatically in from one to four minutes, according to the time for which it had been set. In addition to this the apparatus affords the means of ringing a bell in any room at any time by simply pressing on a spring numbered to correspond with the room. In the event of fire, or when a general alarm is necessary, the clerk or other person in charge has simply to push over a lever, which is immediately caught and held fast, thus instantaneously and simultaneously ringing all the bells in the rooms. These will continue ringing until the lever is released. We are informed by the company that the annunciator operates the same as it ordinarily does when not connected with this system. We are further informed that annunciators already in place can be employed with this system at very small expense.

Rule Trammel Points.

It is often the case that some simple device attached to a tool which is made for carpenters' use will give a new field of usefulness to it; at the same time it greatly facilitates the employment of the tool in special directions. The Stanley Rule and Level Company, of 29 Chambers street, New York, and New Britain, Conn., are introducing a device that merits these remarks. It is known as Stanley's Rule Trammel Points. It is illustrated in Fig. 10 of the engravings. The trammel head is so constructed that it may be readily applied to a common folding rule of any ordinary width. Two of the heads have adjustable steel points, and may be used to describe circles or to draw parallel lines, in place of common dividers or regular trammel points. The third head which is supplied in the set, holds a pencil, and is useful in cases where a steel point is not required. The cut so clearly shows the character and method of the use of these points, that further description is scarcely necessary.

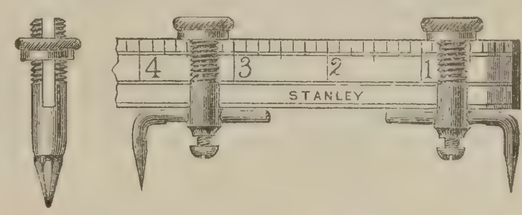


Fig. 10.—Rule Trammel Points.

Heavy Planer and Smoother.

The demand for something better in the way of a planer and smoother than has heretofore been produced has resulted in the machine shown in Fig. 9 of the engravings, which the Egan Company, 221 to 241 West Front street, Cincinnati, Ohio, have just brought out. The makers assure us that the machine is capable of doing finer and smoother work at a greater rate of speed than any other planer now in use. It is constructed on an improved principle, and in

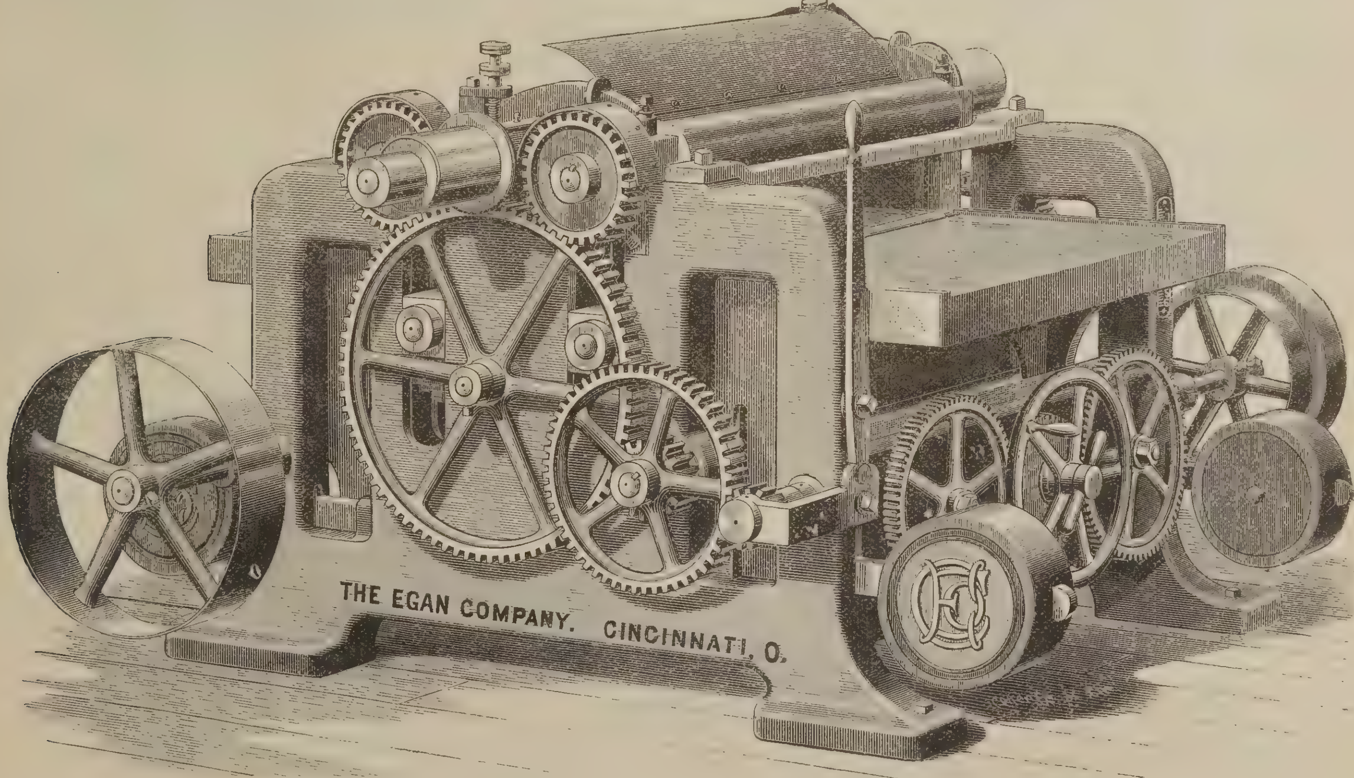


Fig. 9.—Heavy Planer and Smoother. Built by the Egan Company, Cincinnati, Ohio.

such a manner as to combine strength and solidity—two factors which tend to make a perfect smoother. The frame is cored and is very substantially braced, and in all respects is well constructed for a machine of this class. The table is dovetailed into the frame and raises and lowers on long inclines by means of two screws operated by a hand-wheel convenient to the workman. This means of adjusting the bed is considered the best known, and makes the bed absolutely solid and free from vibration. A further advantage is that this construction secures for the bed more support from the underside than is otherwise obtained. The feed consists of four powerfully geared feed rolls 6 inches in diameter, making a feed that can be relied upon under all circumstances. The feed rolls are weighted on an improved principle; the weights being adjustable to give more or less pressure, as desired. A number of changes of feed are provided; but we are assured by the makers that the machine will do excellent smoothing even when the fastest feed is employed. The cylinder is four-sided so as to use either two or four knives. It is double belted and the feed is run directly from the cylinder. Pressure bars are provided on each side of the cylinder, which work to the circle of the hight, thus preventing all tearing out of cross-grained, curly or knotted stuff, or the clipping off of ends. Carpenters and builders will find this machine particularly adapted for smoothing both hard and soft wood for inside finish, such as paneling, wainscoting, &c., from the fact that it does much finer work than is ordinarily secured from machines, particularly on quarter-sawed lumber, now so much in use. Planing mills and other wood-working establishments will find this machine surpassing other machines on fine work, while its capacity adapts it for general work as well.

Novelties.—Fig. 11.—Ladd's Improved Door Fastener. Position of Parts when Door is Closed

Ladd's Patent Door Fasteners.

Sargent & Co., New Haven, Conn., and New York, have recently put on the market a new door fastener, the invention of E. O. Ladd, of Ladd, Curry & Hanmer, Boston. They are illustrated in the accompanying cuts, Fig. 11 showing the position of the fastener when the door is closed and bolted, and Fig. 12 showing the position of the fastener when the door is partially open. These illustrations indicate the special features and operation of the fasteners. It will be seen that it is a combination of a door bolt, fastening the door as securely as the ordinary bolt, and a door fastener, securing it partially opened similarly to a chain bolt. The points made in regard to it are: That it is compact, occupying only the space of the common bolt, while, at the same time, it possesses all the advantages of the chain door fastener without its objectionable points, such as marring the edge of the door when open, &c. It is also to be observed that this fastener, working automatically, fastens the door the moment the same is closed, and does not require the door to be closed and the key turned in the lock in order to fasten it, as does the regular chain fastener. The fact that it is ornamental, strong and not liable to get out of order is also referred to. It is made 8 inches in length, of bronze metal. The fine appearance of this fastener is clearly shown in the engraving.

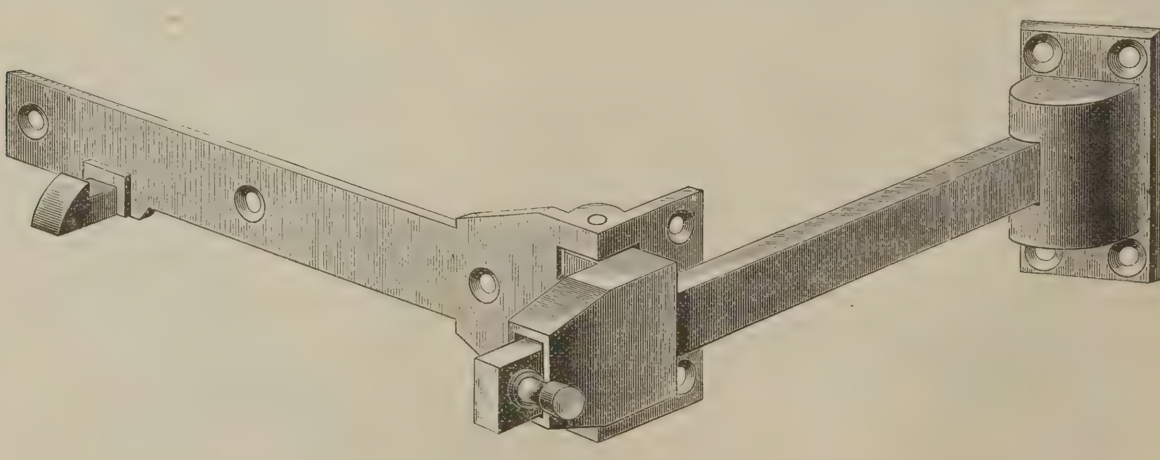


Fig. 12.—Ladd's Door Fastener. Position of Parts when the Door is Partially Open.

Combined Rip-Saw, Borer and Shaper.

Post & Co., with office at 154 Lake street, Chicago, Ill., are introducing the machine shown in Fig. 13 of the engravings. It is a rip and cross-cut saw, borer and shaper, all in one. As will be seen by the engraving, the machine is compact, and yet we are assured by the makers that it is provided with every convenience necessary for its operation. The machine has a heavy hardwood frame, put together with joint bolts and a hardwood top glued up in strips. To the top there is attached a drop-leaf so arranged as to be adjustable to any desired bevel by a hand wheel screw. The table is 4 feet 10 inches long and 3 feet 8 inches wide; it can be raised and lowered by the crank shown in the engraving. A very convenient arrangement, to which the makers direct special attention, consists in the adjustable counter-shaft, whereby endless belts are adapted for use. If the belts become loose they can

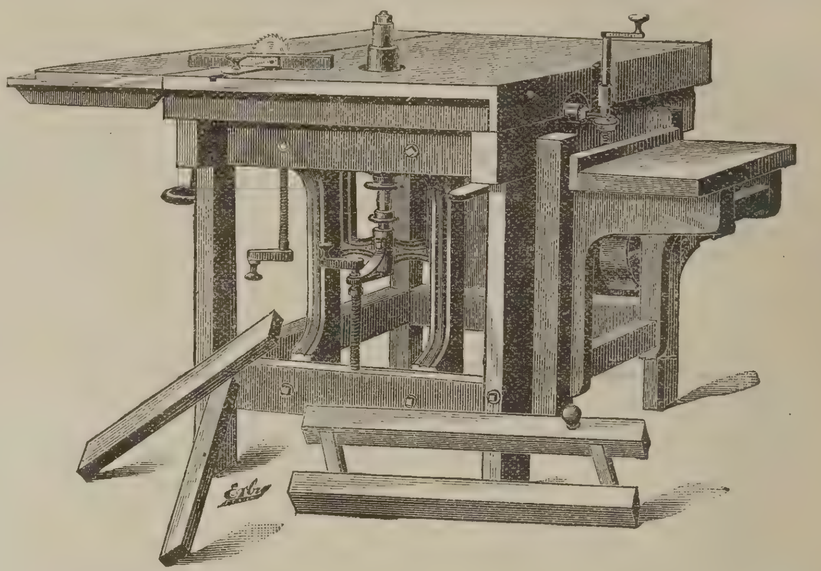
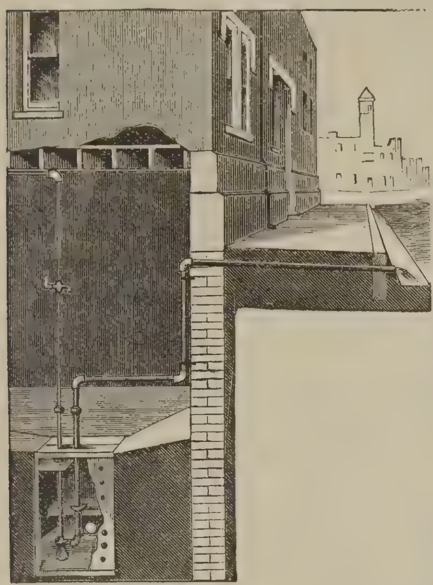


Fig. 13.—Combined Rip and Cross Cut Saw, Borer and Shaper. Manufactured by Post & Co., Chicago, Ill.

be tightened by adjusting the counter shaft, which is connected with the machine. This is considered a great convenience in setting up. The machine, as a saw, is provided with three gauges, as follows: One each, adjustable, rip and bevel gauge, and one cross-cut gauge. The sawing and boring



Novelties.—Fig. 14.—Automatic Cellar Drainer in Position.

devices may run at the same time without interference. At the end of the saw arbor there is fitted a Little Giant Drill Chuck, adapted to hold any size bit shank up to ½ inch inclusive. The adjustable side table can be lowered 6 inches from the point of bit, and is operated by a crank wrench, which can be taken off when not in use. The spindle of the shaper is made to run one way, with collars for knives or solid head, and has a vertical adjustment by means of a crank screw in front of the machine. To use the shaper the only change necessary to be made is to take off the c rcular saw and bring the shaper into position by means of the crank screw.

The Triumph Automatic Cellar Drainer.

Friedenwald Bros., 216 North Holliday street, Baltimore, Md., are manufacturers of the Triumph Automatic Cellar Drainer, the general appearance of which is shown in

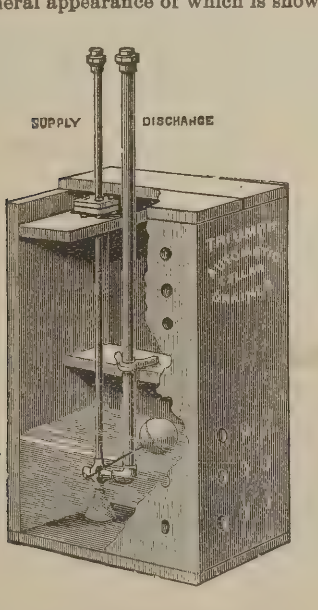


Fig. 15.—Broken View of Drainer.

Figs. 14 and 15 of the illustrations. This de vice is intended for draining water from cellars, sub-cellars, cesspools, excavations, and other low lying spots where water is apt to accumulate and prove disagreeable and troublesome. The motive power by which the work is accomplished is the pressure of water obtained direct from a hydrant in cities and towns where there is a public water supply. The drainer is automatic in its action, and the claim is made for it that from the nature of its construction it requires neither care nor watching. The parts are not liable to corrode or get out of order, for they are made entirely of brass and have no springs or ground-cocks, rubber or leather washers. When boxed ready for shipment the drainer is 3 feet deep, 12 inches wide and 18 inches long, the box being completely sunk below the level of the cellar, as shown in Fig. 14. Fig. 15 presents an enlarged broken view of the device, while in Fig. 16 the ball float, which controls its operation, is presented. It is hardly necessary to state that the drainer should be placed in the lowest part of the cellar and so arranged as to receive all the accumulated water. The operation of the drainer is simple and may be briefly described. The water runs into the box through the auger holes shown, and when it rises to a hight of about 6 inches it carries with it the ball float, which, in turn, after it is raised to a certain hight, turns on the water pressure from the hydrant

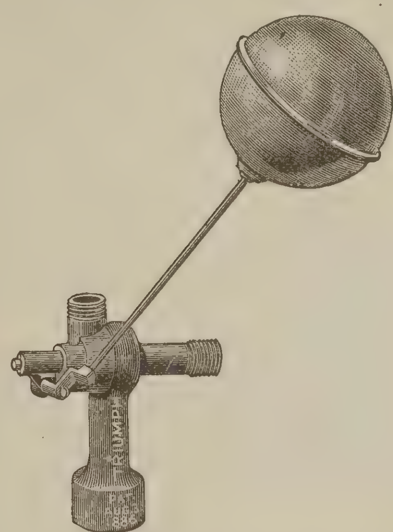


Fig. 16.—Enlarged View of Ball Float and Valve.

automatically. The water from the hydrant thus admitted drives out into the street or sewer the accumulated water in the box. As this operation proceeds and the level of the water in the drainer falls the ball float lowers with it, and finally when the water is all driven out the hydrant is turned off. This operation is repeated as often as the water accumulates sufficiently in the drainer to bring the ball float into operation. The arrangement of the pipes shown in Fig. 14 can of course be altered to suit the requirements of special cases. As there indicated, the drain water is thrown out into the gutter, but it is equally feasible to run the drain into a sewer. A particular advantage to which the manufacturers direct attention is the fact that the drainer is entirely beneath the surface of the cellar, so that its mechanism cannot be interfered with by children or meddlesome persons. A table of the hights to which the Triumph drainer will raise water out of cellars, accord to the pressure of the hydrant, shows that with 15 pounds hydrant pressure the water will be raised 3 feet; with 50 pounds pressure it will be raised 24 feet. With higher pressures it is possible, of course, to drain water from still greater depths.

Adjustable Chisel Gauge.

The Stanley Rule and Level Company, of 29 Chambers street, New York, and New Britain, Conn., among other new things, are putting upon the market an adjustable chisel gauge, the features of which will be gained by examining Fig. 17 of the engravings. In the matter of blind nailing, which has become more common of late than formerly in the finish of many kinds of woodwork, an attachment to any ordinary ¼-inch chisel is

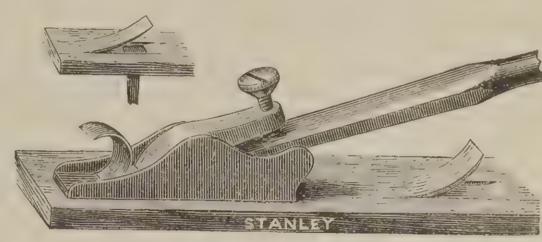


Fig. 17.—Adjustable Chisel Gauge.

frequently of great service. Such a device is here illustrated. With the beveled edge of the chisel up and the gauge secured at the proper distance from the cutting edge, a shaving can be turned accurately and so uniformly that when it is glued again it will be found to fit the recess perfectly. The article is so simple that it is inexpensive. It is something that many of our readers will appreciate and will be glad to include in their "kits."

Portable Rope-Hoist.

We show in Fig. 18 cut of a portable rope-hoist, put on the market by the Energy Mfg. Company, 1115-1123 S. Fifteenth street, Philadelphia, Pa. It is specially designed for use where only one man is available for lifting from 300 to 2000 pounds, the use of rope instead of chain making it easy to handle. The rope will last for years, and when worn out will cost only a small sum to replace. The wheels, moreover, can be made lighter than for chain hoists. The hand rope is independent of the lift rope, and can be worked at any angle. The hoist has been in use for several years and has given entire satisfaction. The ropes cannot kink, as they undergo a special process before they are spliced. The hoist is fitted with a swivel

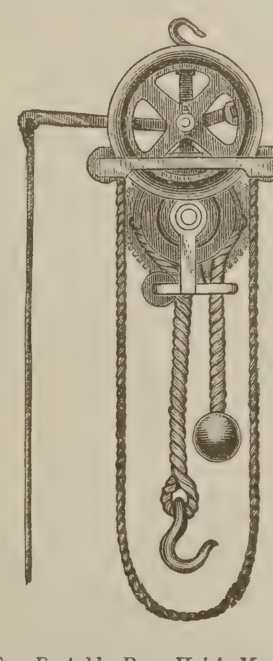
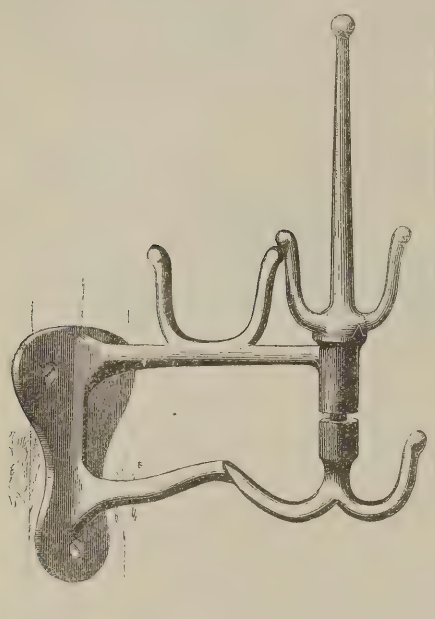


Fig. 18.—Portable Rope-Hoist, Made by the Energy Mfg. Co., Philadelphia, Pa.

hook, by which it can be attached to any support. The machine simply consists of a frame between which are placed a pinion gear and binding yoke. The hand-rope wheel, upon which the automatic brake acts to prevent any accidental lowering of the

load, is placed outside the frame. The binding yoke, which is placed above the pulling wheel, binds the rope into the sprockets of the latter and prevents its raising, which would cause the slipping of the rope, and also does away with the use of a drum for rope to wind around. At the bottom of



Novelties.—Fig. 19.—New Departure Wardrobe Hook Closed.

frame is placed a shive wheel, which is to make the load pull in line with hook placed at the top of the frame. The hoist cannot lower except when brake rope is pulled upon. The automatic brake which is used will hold a load at any point, and will allow the operator to lower quickly or slowly by simply pulling on the brake rope. The shafts in the hoist are made of steel, and the frame of malleable iron.

New Departure Wardrobe Hooks.

Jayne & Crosby, 110 Liberty street, New York, have recently put on the market a line of wardrobe hooks which they designate as New Departure, the special features of which are shown in the accompanying illustrations, Fig. 19 representing one of the

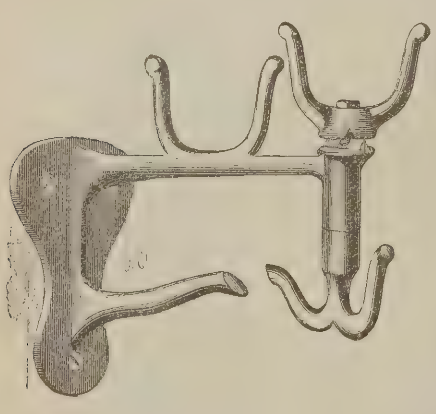


Fig. 20.—New Departure Wardrobe Hook Open.

hooks, with an upright for supporting a hat, and Fig. 20 showing a pattern hook without such upright. The cuts also illustrate the capacity of these hooks in the number of arms on which garments may be hung, and also show the feature of special novelty in the manner in which a number of garments can be placed on the lower arm of the hook, and any desired one removed without having to take off the others, Fig. 19 showing the hook closed, and Fig. 20 showing it open. It will thus be seen that the outer portion of the hook is swiveled, making a continuous arm when the hook is closed, and thus permitting a number of garments to be placed upon it. When it is desired to remove one of these garments which is further in than the others the supporting tapes of the outer garments are drawn forward on to the swiveled hook, when, by turning this to the right or left, the hook is opened and the desired garments can be taken off. Then, by turning the hook back to its original position and by sliding the tapes back and forth, any garment wanted can be obtained without removing the others. The swiveled standard, it will be observed, is so constructed that when turned aside from its regular position it is raised in such a way that with the weight of the garments upon it its tendency is to close itself. The illustrations given of this hook represent what the manufacturers regard as the most practical form of construction of eight different methods for accomplishing the same object that are covered by other patents. The hooks represented above project from the wall a little more than 6 inches, and the length of the lower arm, including the swivel hook, which is a continuation of it, is 4 inches.

Extension Plumb and Level.

An improvement that greatly enlarges the scope of an ordinary carpenter's level is being introduced by Tower & Lyon, 95 Chambers street, New York. It is known as Wood's Patent Extension Plumb and Level. The appearance of the device is shown in Fig. 21 and 22 of the engravings. To an

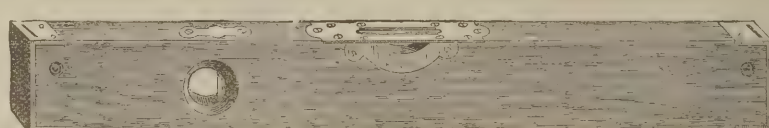


Fig. 21.—The Extension Plumb and Level with Sights Out of Use.

ordinary carpenter's level there is attached, at each end of the stock, a brass plate. In one of these is a sight, while through the other a larger opening is cut, and across it is stretched a wire. The idea is that by these sights the level may be used for leveling purposes. The sight pieces already referred to and clearly shown in the engravings, work automatically in the ends of the level. They are pushed down out

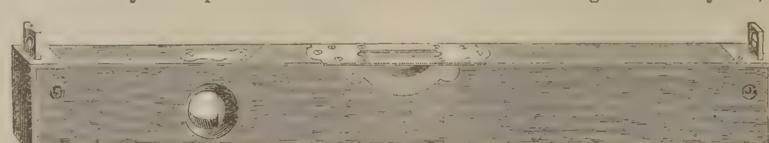


Fig. 22.—Extension Plumb and Level with Sights Elevated.

of the way when not in use, and instantly spring up into position, as shown in the cut, upon touching a button that is provided in the side of the stock. When the sights are down the level is in the usual shape for use. This tool is available for lengths of 100 feet or more, and also for shorter lengths, without the cumbersome and unreliable straight-edge commonly used with the ordinary straight level. Mechanics who have been accustomed to sighting along the upper edge of a level in its use, will appreciate this attachment of special sights. The makers inform us that the sights are accurately adjusted, and may be relied upon to extend the horizontal line to any distance required. They state further that a compact, 18-foot level, with this improvement, will do more than a large level—say, 30 inches long, without it. The small level is convenient to handle and light to carry; hence the general advantages.

Perforated Steel Settees.

The Harrington & King Perforating Company, Chicago, Ill., are putting on the market a line of perforated steel settees, the characteristics of which are shown in Fig. 23 of the engravings. These settees are described as very strong and light, the average weight being 45 pounds. They have, it will be seen, an iron frame and are well braced. They are furnished either galvanized or painted green or red. The galvanized settees which have been in use experimentally for two years are referred to as showing no change except the inevitable weather stains, and are practically indestructible, while from their lightness they can be coveniently handled on the lawn or veranda. They are designed for use in parks, verandas, lawns, waiting rooms, hotels and public places, also for railway and horse-car settees, steamer decks, &c. Their durability is referred to, and the fact that they cannot be mutilated by the universal Yankee whittler. The galvanized settees are alluded to as easily cleaned or scoured and looking well for years, while the painted ones can be repainted when required, and thus made as good as new. The company are making this line of goods in several fancy patterns of openings in the settees—hexagon, diamond, clover leaf, &c.

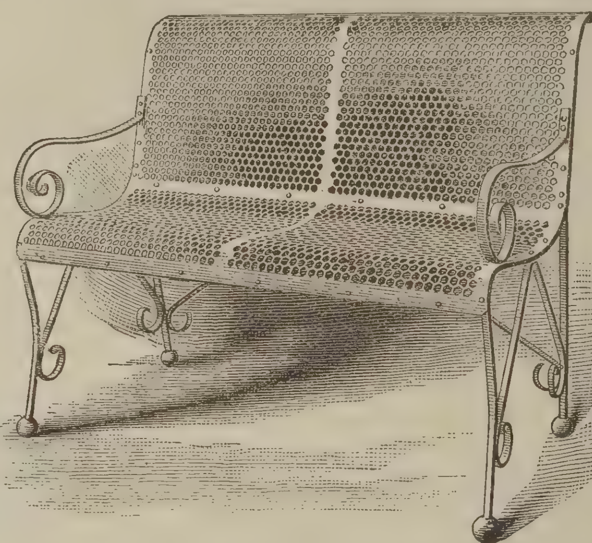
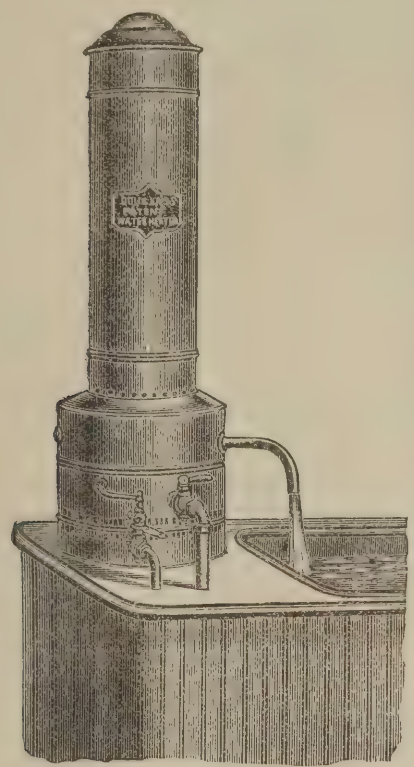


Fig. 23.—Perforated Steel Settee.

Douglas's Instantaneous Water Heater.

The Instantaneous Water Heater Company, 87 Dearborn street, Chicago, Ill., are putting upon the market Douglas's patent



Novelties.—Fig. 24.—General View Douglas Patent Instantaneous Water Heater.

water heater, the appearance of which is shown in the accompanying engravings. The heater, which is an Australian invention, has not long been introduced into the United States, though it is said that in other countries it has given excellent satisfaction. It is designed for use in any place where hot water is required and gas and water are

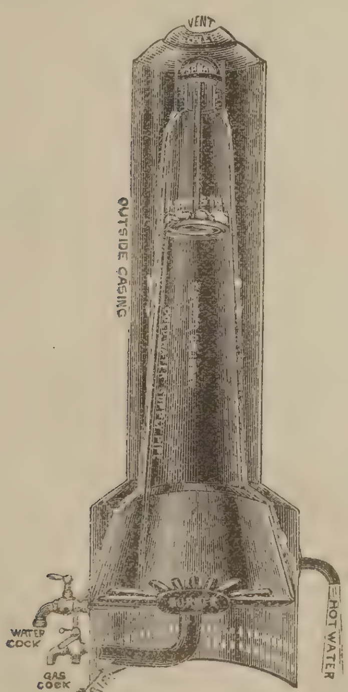


Fig. 25.—Sectional View of Heater.

obtainable. A general view of the heater in connection with a bath-tub is shown in Fig. 24 though it need not be said that the heater can be placed in any other more convenient position if desired. In Fig. 25 a sectional view of the heater is presented, showing the general way in which the water is heated. The water when turned on passes up through the cold water supply-pipe through the coil in the upper part of the heating drum, and finally is sprayed over a copper cylinder, the interior of which is heated by a Bunsen burner. In its descent it trickles down the outside of this cone, collecting in the annular space at the bottom of the heater and passing to the bath-tub or other receptacle through the hot-water pipe shown at the right. It is thus seen that the construction is exceedingly simple, so simple, in fact, that no further descriptive particulars are necessary to a thorough understanding of it. The No. 2 heater, which is illustrated in the cut, is 15 inches in diameter and 42 inches high. The claim is made for it that it will heat 3 gallons per minute to 100° F., taking the water at a temperature of 60°, and that this heating is done for less than 1 cent's worth of gas for a large bath-tub, allowing the price of gas to be $1 per 1000 feet. The same company make a No. 1 heater, 9 inches in diameter and 24 inches high, which is more particularly adapted to heating water for wash-basins and smaller receptacles. It is evident that by turning the water on very slowly it can be heated to a much higher temperature than above stated. In referring to this article the company call attention to the fact that it requires only ordinary care in using, and that as it does not hold water when not in use there is no danger of it freezing.

The Gem Saw Filer.

In Fig. 26 of the engravings we show a little device for regulating the angle at which a saw file is held in the act of filing a saw, which is being put upon the market by the Gem Saw Filing Company, Post Office box 1507, New York city. Fig. 27 shows the application of the device to the file, and indicates how it facilitates using the file. The point of three-cornered file is inserted in the hole provided for the purpose, and the article is fastened against it by means of the set-screw shown in the engraving. The lower part of the pointer which swings under the index is weighted and moves by gravity, thus showing the angle to which the file is tilted, either right or left. Accordingly, the filer has no excuse for holding the file in any other position than at the angle that he desires, and has means at hand for constantly keeping the file in one position. The graduated plate is bent slightly backward, so that the index is always in sight of the operator. A thumb-piece just back of the graduated plate affords a means of holding and bearing on the end of the file, which greatly facilitates the labor of filing the saw. The article is made of brass, and seems from the sample submitted well adapted for the purpose which the inventor has in view. We understand that the company are sending these devices by mail.

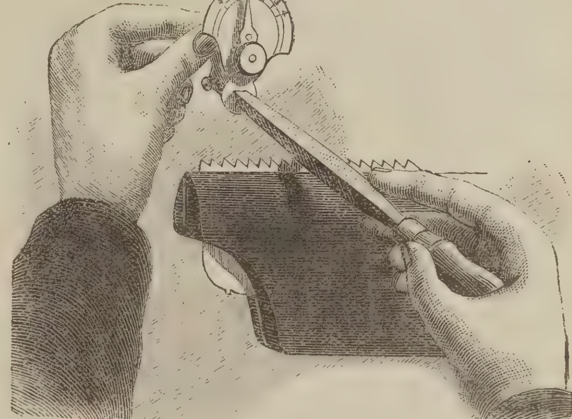


Fig. 27.—Gem Saw Filer in Use.

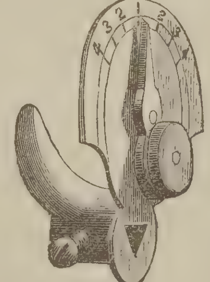


Fig. 26.—Gem Saw Filer.

The durability of metal roofs is thus discussed by the *Architect, Builder and Mechanic:* "Nearly all of the common metals may be used for covering roofs, as tin, iron, zinc, copper and lead. In this country the matter of cost enters so largely into the use of these metals that the only one used to any extent is what we term tin, but is in reality iron coated with tin or lead. Copper has been extensively used in the countries of Europe for roofs, and is beginning to find favor in this country, even if the cost is greater than any other covering. On the score of durability in roof metals copper may be rated the first and best, followed by tin and iron respectively. Iron has its objection from the fact of its liability to rust, which may in a measure be obviated by heavy coats of lead oil paint. Galvanized iron removes this almost entirely, but the nature of this iron is so sensitive to the action of heat and cold that it becomes a dangerous metal to use, especially if put on with a sharp bent or doubled hook. Hence the failure of many iron roofs. Tin, from the malleable nature of its composition and its extreme pliability, renders it superior to iron for covering of almost any kind. Zinc would be an excellent material but for the effect of heat and cold, rendering it a still more uncertain covering than iron."

Painting on Cement.

According to the *Bulletin de la Ceramique*, it is known that the caustic lime which is not in a state of combination in cement saponifies the oil used in painting. Consequently, painting on cement is only practicable when, under the influence of the air, carbonic acid has united with the caustic lime to form carbonate of lime. When it is desired to paint cement without delay, attempts are sometimes made to neutralize the lime by acids; but the above-named journal recommends in preference the use of carbonate of ammonia, the acid of which combines with the lime while the acid is liberated. The effect produced is, however, only superficial. Various other expedients are referred to, but the solution of the problem would seem to consist in the use of caseine. Fresh white cheese and slaked fat lime are added to the color. This mixture hardens rapidly, assumes the consistency of stone, and is insoluble in water, a formation of albuminate of lime taking place. It is according to this system that the mural paintings at the Berlin War Museum were executed.

To make the composition, three parts of cheese and one of slaked fat lime are stirred, the quantity of color to be added being regulated by practice. Only earth colors or oxides of iron would be used for light red to dark brown shades; for blue, ultramarine or cobalt blue would be used; for white, oxide of zinc or sulphate of baryta, and for black, animal black. Inorganic colors, such as those of aniline, would not be used, nor would Prussian blue, vermilion, blue ocher and white lead be employed, on account of the injurious effects of the sulphur present in the cheese in combination with these substances. If the painting surface is too dry it can easily be damped. The caseous lime should be prepared daily, and the brushes should be cleaned after the application of each coat of paint. The process thus described is recommended for its economy, the walls of a house being painted as fast as the scaffolding is removed. The caseous paint does not easily take fire, and is, therefore, considered particularly suitable for the decoration of theaters and for application to stage carpenter's work generally.

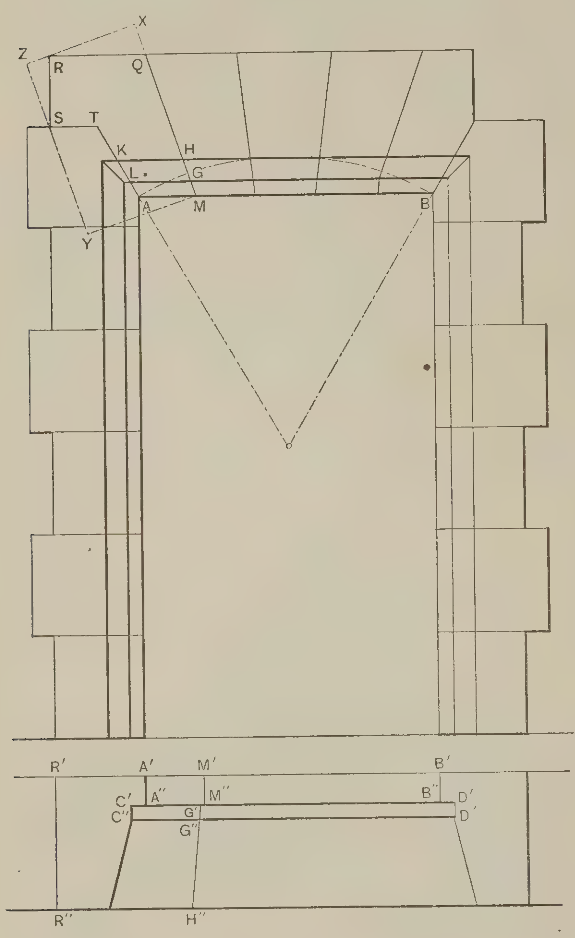
Masonry.

Masonry and Stone Cutting.

(Continued from page 254, December.)

FLAT ARCHES.

In our example (Fig. 9) we show the interior elevation of a square-headed doorway. The faces A′ A″ and B′ B″, shown on plan, are the outside reveals of the doorway; the narrow fillets C′ C″ and D′ D″ are the rebates to lodge the thickness of the door; the



Masonry and Stone Cutting.—Fig. 9.—Interior Elevation of Square-Headed Doorway.

distances C′ A″ and D′ B″ which separate the rebate from the reveal are its depth; the splayed sides toward the interior of the wall allow the door to be more conveniently opened than if they were straight. The uppermost stone of the door jamb rests on the wall and forms the abutment of the arch.

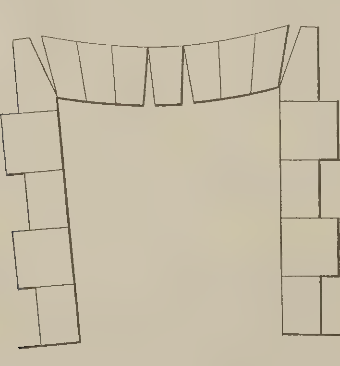


Fig. 10.—How a Flat Arch is Destroyed.

The voussoir next to this is the springer. In our opinion, for a square-headed door formed of stone voussoirs the thickness or vertical dimension of the head or lintel should be equal to at least two-thirds of the width of the doorway, for only a part of the joint of each voussoir receives a solid abutment from the wall—that is, the part of each joint which is above an arc of a circle drawn from the center where the joints of the voussoirs converge. The ends of the voussoirs below this arc are really only a load and not a help to the safety of the archway. The center of convergence for the joints of the voussoirs is usually the apex of an equilateral triangle formed on the opening A B.

In Fig. 10 we have shown how a flat arch is destroyed; the joints gape at the bottom part of the keystone and at the upper part of the springer, so that the first voussoir turns round its lower arris next to the springing line. To prevent this, the first voussoir is often made with an elbow, as shown on the left hand of Fig. 9; the weight of the wall above the elbow helping to keep this voussoir firm, so that it partly belongs to the jamb of the archway. On the right-hand side of Fig. 9 we show how the lower part of the joints of the voussoirs are sometimes cut so as to be perpendicular to the soffit of the arch; but, as we have said before, such devices are nearly as objectionable as the acute angles they are made to correct. In our opinion, the best arrangement is to make the joints of the voussoirs simple planes, and just ease them at their lower part by rubbing, so that from the dotted arc downward they come not into close contact. At all events, broken bed-joints must never be used for the keystone, for this should be made rather longer than required, and rammed in as tight as possible. The cutting of the keystone at the back should be done on the work after the stone is in its place, which will be found very easy to execute. As to the use of the elbows, we think it is more a question of taste than of construction; if used, they must be worked with the greatest care and bedded in cement, so as to prevent any danger of unequal pressure in settling.

We shall now cut the voussoir A M Q R S T (Fig. 9). The stone from which it will have to be cut must be as long as the thickness R′ R″ of the wall (see plan), and its end face must be at least equal to the dotted line X Z Y M (see elevation), which comprises the elevation of the voussoir. We give that stone in perspective (Fig. 11).

Let $x\ m\ m'\ x'$ be its natural bed in the quarry; we work that surface to a true plane and delineate thereon the face of the joint M Q (Fig. 9), this is the polygonal figure of $q\ q'\ m'\ m''\ g'\ g''\ h\ q$ (Fig. 11) which we get by making $q\ h$ = Q H, $q\ q'$ = R′ R″, $q'\ m'$ = Q M, $m'm''$ = M′ M″, $m''\ g'$ = mG, $g'\ g''$ = G′ G″. Then, with the help of a square, we work the two end planes $x\ m\ y\ z$ and $x'\ m'\ y'\ z'$ of the stone, and draw on both of them the outline of the stone in elevation; these outlines are (Fig. 11) $a\ m\ q\ r\ s\ t$ and $a'\ m'\ q'\ r'\ s'\ t'$. We can now work the lower bed joint $a\ t\ t'\ a'$ of the voussoir, thanks to the directing likes $a\ t$ and $a'\ t'$, across which we can lay our straight-edge. We shall cut in the same way the sides $s\ t\ t'\ s'$, $s\ r\ r'\ s'$, $r\ q\ q'\ r'$.

As to the soffit of the voussoir, we might begin by working the whole of the surface $a\ m\ m'\ a'$, and then from that pass on to the rebate and the splay. But this would involve a waste of labor, as part of the surface $a\ m\ m'\ a'$ will have to be removed. To avoid this, on the plane of the lower joint $a\ t\ t'\ a'$ we delineate $t\ t'\ a'\ a''\ l'\ l''\ k\ t$, the real outline of that face by making $a'\ a''$ = A′ A″, $a''\ l'$ = A L, $l'\ l''$ = G′ G″; and then we have all the directing lines $a'a''$ and $m'\ m''$, $a''\ l'$ and

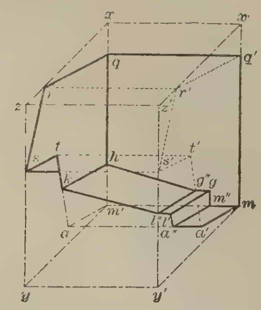


Fig. 11.—Cutting of the Voussoir A M Q R S T in Fig. 9.

$m''\ g'$, $l'\ l''$ and $g'\ g''$, $l''\ k$ and $g'\ h$ required for working the planes which form the soffit of the voussoir.

WORKING CYLINDRICAL SURFACES.

To work cylindrical surfaces, such as the soffit of the voussoirs in an archway, two methods can be used. In the first method,

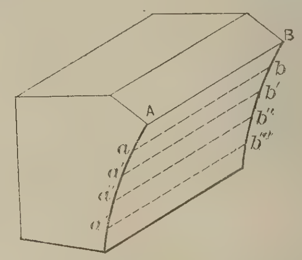


Fig. 12.—First Method of Working a Cylindrical Surface.

Fig. 12, the curved arris at each end of the voussoir is delineated by the help of a head-mold taken from the elevation of the arch. The two curves, A a, a' a''; B b, b' b'' are then used as guiding lines, and the cylindrical surface can be then worked with the help of a straight-edge as easily as a plane. The stone is knocked off between the curves, so that a straight-edge laid along parallel lines, such as A B $a\ b$, $a'\ b'$, $a''\ b''$, &c., shall coincide in every part with the surface of the stone.

In the second method, Fig. 12A, a templet is used cut to the shape of the arch. The upper arris, A B, and the lower arris, C D, of the stone beds are used as directing lines; the stone is worked so that the templet placed in any position, Y G, Y′ G′, Y″ G″, &c., perpendicular to the directing lines, shall coincide in every part with the surface of the stone. This second method of working a cylindrical surface has to be used where the ends of voussoirs are not normal to the soffit, but are either skew planes or other surfaces, such as cylinders and spheres.

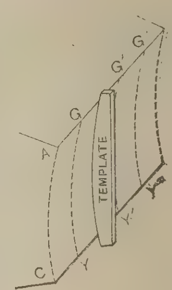


Fig. 12 A.—Second Method of Working a Cylindrical Surface.

(To be Continued.)

We are informed that Gen. M. C. Meigs, supervising architect and engineer of the new Pension Building, at Washington, has recently written James B. Scott & Co., of Pittsburgh, who are supplying Scott's Extra Coated Roofing Plates for that building, that on the roof in question, embracing something over 42,000 square feet, not a complaint could be made as to the character of the roofing plates. The contractor also speaks in praise of the tin.

Course in Pattern-Making, Sibley College, Cornell University.

We had the pleasure, some months ago, of presenting to our readers sketches of the introductory or manual training course of exercises in the wood-working shops of the Sibley College of Cornell University. It will be remembered that it was then remarked that the method of instruction as of the simplest possible character; though somewhat in advance, usually, of the work in the preliminary course, and as the student exhibits proficiency he is advanced to other portions of the course in which patterns of more and more intricate character are introduced, and he thus progresses until, if well fitted for his chosen profession, he is given the most difficult of constructions in the making of both patterns and of core-boxes. The accompanying sketches illustrate the

Fig. 1 is a drawing of a pattern for a short straight-edge or packing-piece, and is practically an exercise in the making of patterns and castings with plane surfaces, straight edges and square corners. When cast this piece serves a precisely similar purpose in the machine shop, where it is finished up, and later it is used as needed on the planer or the shaper in adjusting the hight of the "work." The piece is drawn to two scales, the one one-half size the other one-eighth.

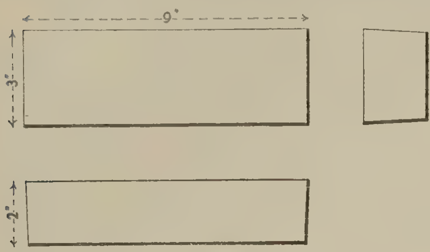


Fig. 1.

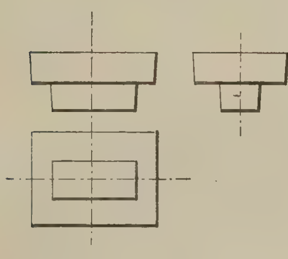


Fig. 2.

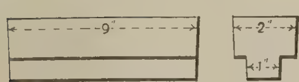


Fig. 3.

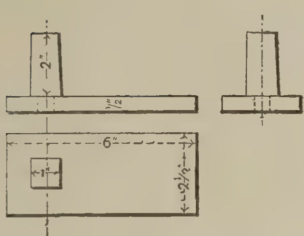


Fig. 4.

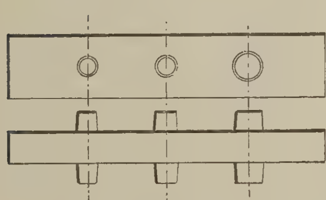


Fig. 5.

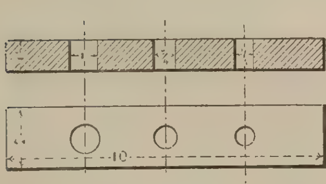


Fig. 6.

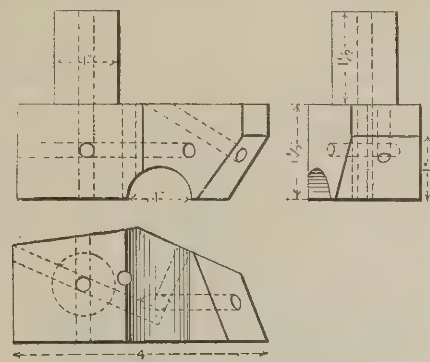


Fig. 7.

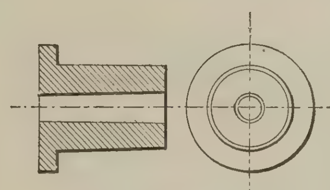


Fig. 8.

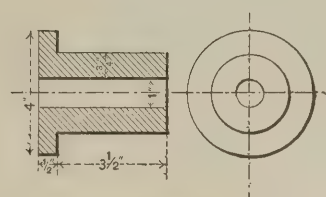


Fig. 9.

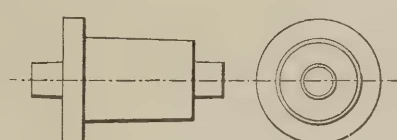


Fig. 10.

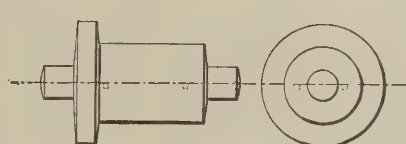


Fig. 11.

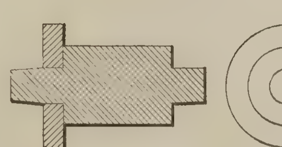


Fig. 12.

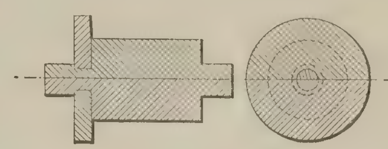


Fig. 13.

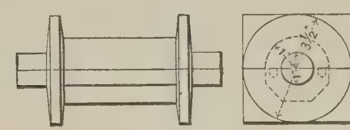


Fig. 14.

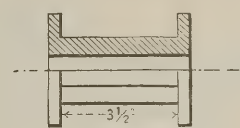


Fig. 15.

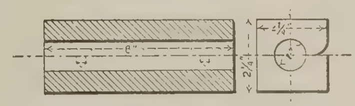


Fig. 16.

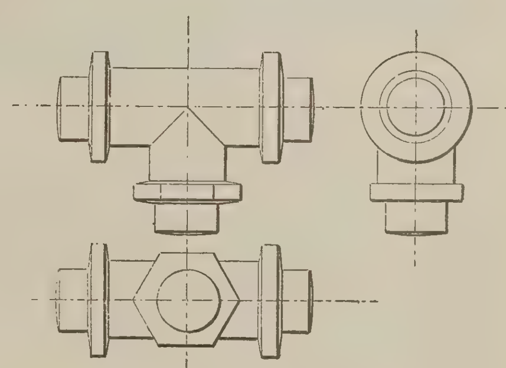


Fig. 17.

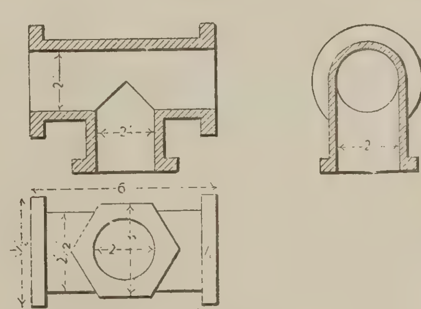


Fig. 18.

Diagrams Illustrating Part of the Course in Pattern Making, Sibley College, Cornell University, Ithaca, N. Y.—Scale, 2 Inches to the Foot.

there conducted is: First, the teaching of the student the use of the tools of the trade by what is often, though incorrectly, called the "Russian" system. This is the portion of the course illustrated by us. It is followed by the practice of carpentry and joinery, of construction as distinguished from instruction simply, the work selected being of as ambitious a character as the acquirements of the student may permit. Similarly, the course of instruction in pattern-making begins with a series of exercises which are beginning of such a line of exercises. These drawings are made by the students of the freshman year—the course is four years in length—and are revised annually in the spring term, preparatory to their use in the succeeding year. Each year sees some improvements introduced, either by the substitution of some better exercises for those which are thought least important or have proven unsatisfactory as means of training, or by the addition of more difficult and more fruitful exercises at the end of the list.

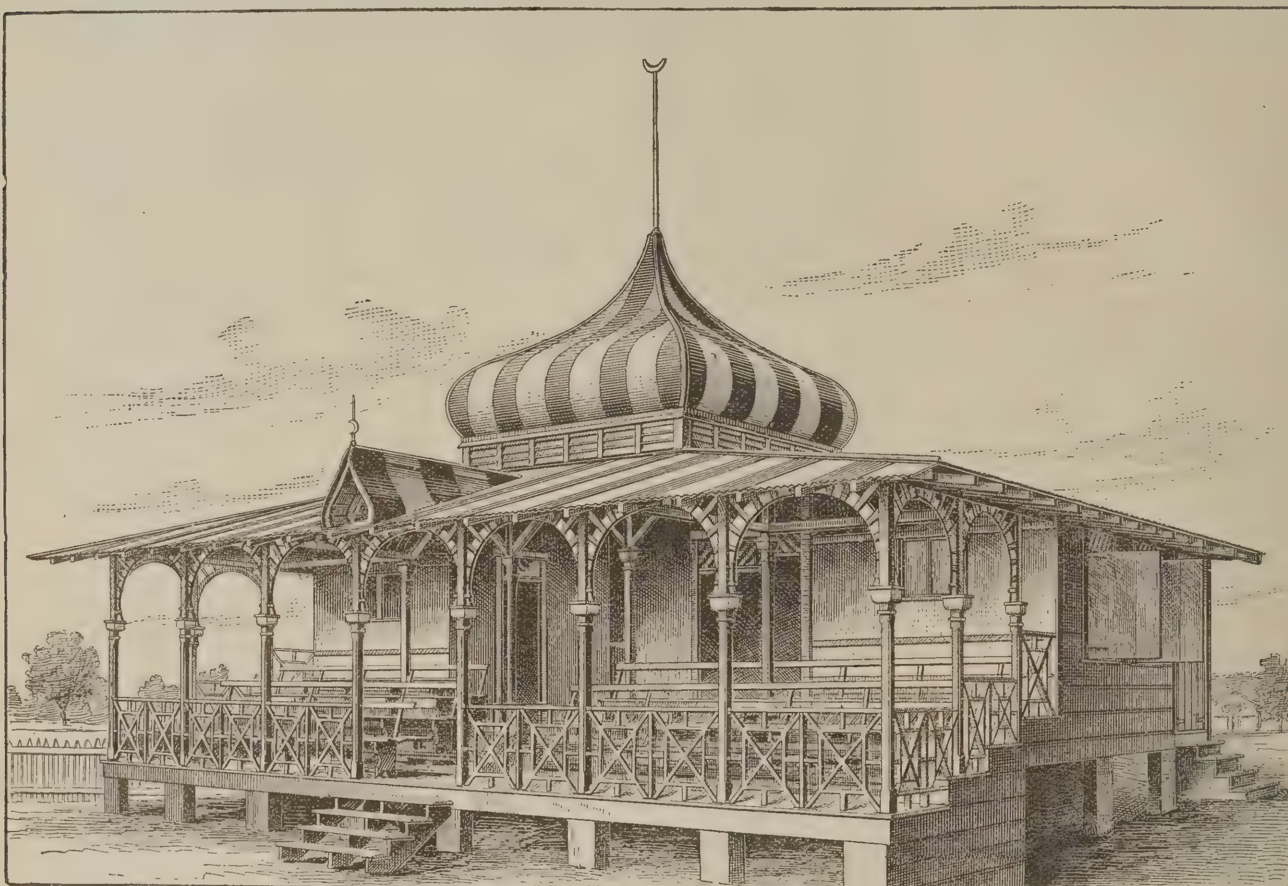
Fig. 2 is a pattern of a cored block, and the drawing made full size shows the draft to be given the print. Fig. 3 is a piece which is a trifle more troublesome, the casting from which is used as a planer exercise. Fig. 4 is a slight variation from the preceding, and gives opportunity in the foundry for showing what can be done by a steady hand in drawing a long print, or a "riser." Fig. 5 is a pattern for a piece to be used as a test-piece in the laboratory of applied mechanics when investigating the strength of any ma-

terials, such as cast iron. Core prints are set, and the holes shown are cored out. The prints are fixed in place by dowel-pins seen dotted in in the side elevation. Fig. 7 is an exercise valuable both for its illustration of peculiar shapes and for subsequent work in metal; it gives some excellent exercises in drilling. The holes shown in the drawing are, of course, not for the information of the pattern-maker, but for the person who fits up the piece in the machine shop. The piece furnishes an exercise in drilling to exact size and in precisely laid out directions. These holes must be all so drilled as to have precisely the relation, the one to another, that is shown in the drawing. The case illustrates well the way in which one part of the work in one is made to meet the call of another department.

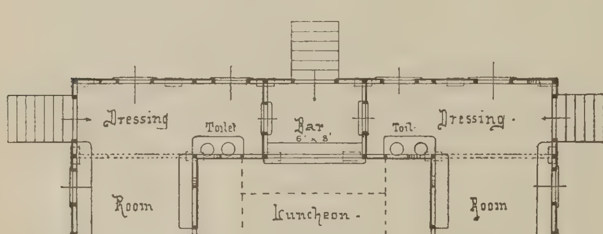
Nos. 8 to 15 inclusive show different methods of making a pattern for a flanged piece, having a hole carried through it longitudinally. It is first made with flange attached to the pattern, and hole bored to make its own core, the whole in one piece. The student sees that considerable draft is demanded in the hole, and that this means some time and cost in boring out when finishing the piece, and also in turning off the flange. The uncertainty and difficulty of setting the pattern in a two parted flask, and of thus getting a true cylinder, is discovered as soon as the attempt is made to mold it. The learner is thus led to appreciate the advantages of the succeeding constructions and their relative merits. Fig. 8 is solid, has a fixed flange, but is cored. Fig. 9 is parted in the middle and is cored out; it is molded in half cylinders. Fig. 10 is made with a detachable flange and is cored; it is solid and is molded by drawing it lengthwise. The loose flange is not essential, but it is convenient. Fig. 11 is parted along its axis, has a pair of loose half flanges and is cored. It is molded in a common snap flask. Fig. 12 is a pattern for a common "brass" to be cast solid and cut into its two halves after it has been bored and finished. Fig. 16 is the core-box for the set of flanged patterns. Fig. 17 is a pattern for a brass "T" for heavy steam or hydraulic piping, and Fig. 18 is its core-box. This is an excellent piece of practice work and its product is always sure to be useful. It is one of the best possible exercises in nice cutting and fitting, and brings into play a great many points of practice. It is so small and thin that only good work can make sure of a good casting. The above shows about one-third of the exercises. The subject of pattern making is attracting special attention at the present time in various directions. Hence the interest this course has for our readers. At another time we shall present the remainder of the drawings.

Cricket Pavilion.

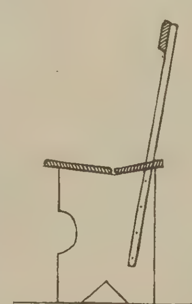
An American cricket team visited the island of Trinidad, in the British West Indies, late in December. The Sovereign Cricket Club of the island erected a special pavilion for the purpose of having a suitable place in which to receive the visitors. The architect of the work was Mr. G. Gerold, some of whose designs have already been presented to our readers. He has sent us elevations, sections and plans of the work, together with a photo-negative of the finished structure, and from them the engravings presented to our readers herewith have been made. Referring to the features of the structure, it will be noticed by the plan that the pavilion contains a lunchroom 15 x 20 feet and two dressing-rooms 10 x 18 feet, with adjoining toilet-rooms. These rooms are conveniently arranged around a common bar, from which service to each is obtained. At the front there is an amphitheater with five ranges of benches, and seating 100 persons. The amphitheater and the luncheon-room are open, so that only the dressing-rooms and the bar are to be locked. The building was erected of pitch pine scantling framed with white pine boards. The foundations consist of concrete pillars 18 x 18 inches. The floor is 4½ feet from the ground; the roof and cupola are covered with galvanized iron and painted in strips, white and red. A low lattice fence surrounds the pavilion and the play grounds. One of the engravings presented herewith shows a detail of the bench which has been employed in seating this building. With reference to the cost, our correspondent states that these benches were produced at the very low price of 10 cents per running foot. The architect informs us that the Moorish style was chosen in designing this building



General View of Cricket Pavilion Recently Erected at the Port of Spain, Island of Trinidad, W. I.—G. Gerold, Architect.



Plan of Pavilion.—Scale, $\frac{1}{16}$ Inch to the Foot.



Detail of Bench.

as the most suitable for a pavilion which stands alone in the center of a plain savanna of about 20 acres. The building was finished in the short period of five weeks, and cost, including the benches and other furnishing, less than $1300.

TRADE NOTES.

GOODELL & WATERS inform us that they are agents in Chicago for the Dodge Mfg. Company for the sale of their wood pulleys. They also inform us that they keep in stock, in their Chicago warehouse, a full line of these goods.

THE ENERGY MFG. COMPANY, Nos. 1115 to 1123 South Fifteenth street, Philadelphia, Pa., are calling attention to the portable rope hoist which they manufacture. It is said to be just the thing for quick lifting and lowering. A descriptive circular is sent to all applicants.

THE ROPER DRESSED CEDAR SHINGLES, which are represented in New York by Wilson Godfrey, with office at 83 Wall street, are a specialty in which many of our readers are interested. Specimens of two grades of cedar shingles are before us as we write. We also have received from the New York agent a colored card for hanging, which contains diagrams of the styles in which these goods are cut; and also diagrams of the patterns that may be formed on the roof of a building by their use. These, we understand, are sent to all applicants; they are of a character to be acceptable to a large number among our readers. The patterns shown are round, diamond, octagon and hexagon; these names applying to the shape of the points. Six different patterns of roof are shown. J. L. Roper & Co., of Norfolk, Va., are the manufacturers.

THE BODA HOUSE FINISHING COMPANY is the name of a company recently incorporated at Dayton, Ohio, the officers of which are as follows: D. F. Hargraves, president; W. J. Boda, vice-president, and S. H. Carr, secretary and treasurer. The object of the company is the issuing of licenses, to planing mills and other manufacturers, on their patent interior wood finishings for residences and other buildings. The company will operate under the patents of W. J. Boda. We understand that a number of licenses have already been issued and that the prospects of the new organization are very favorable.

THE SUBJECT of lightning protection is at present attracting wide attention. The old itinerant lightning-rod peddler, of no responsibility and no definite habitation, whose forte it was to sell goods of no merit at the highest possible price, is giving way to firms of responsibility and to traveling salesmen of scientific attainments, and whose position in the community is assured. Among those who are prominently engaged in the business on the better basis may be mentioned the Munson Lightning Conductor Company, of Indianapolis, Ind. These people inform us that they have found, after many years of experience and careful experimentation in electrical phenomena, that the electrical current is drawn toward points and sharp edges. They inform us further that they have discovered that the electrical discharge is diffused and separated into such fine currents as to be rendered harmless by points and sharp edges; accordingly their conductors have been made to conform to this law. Recent scientific reports and deductions made by electricians and other original investigators confirm this fact, which they had found demonstrated to their satisfaction. Philosophers announce that trees having any pointed leaves are less liable to be struck by lightning, for the reason that the points receive and carry off the electrical discharge, so that the stroke is rendered harmless. This, they point out, sustains the Munson Company in their claim of constructing their conductors in conformity with the laws of nature.

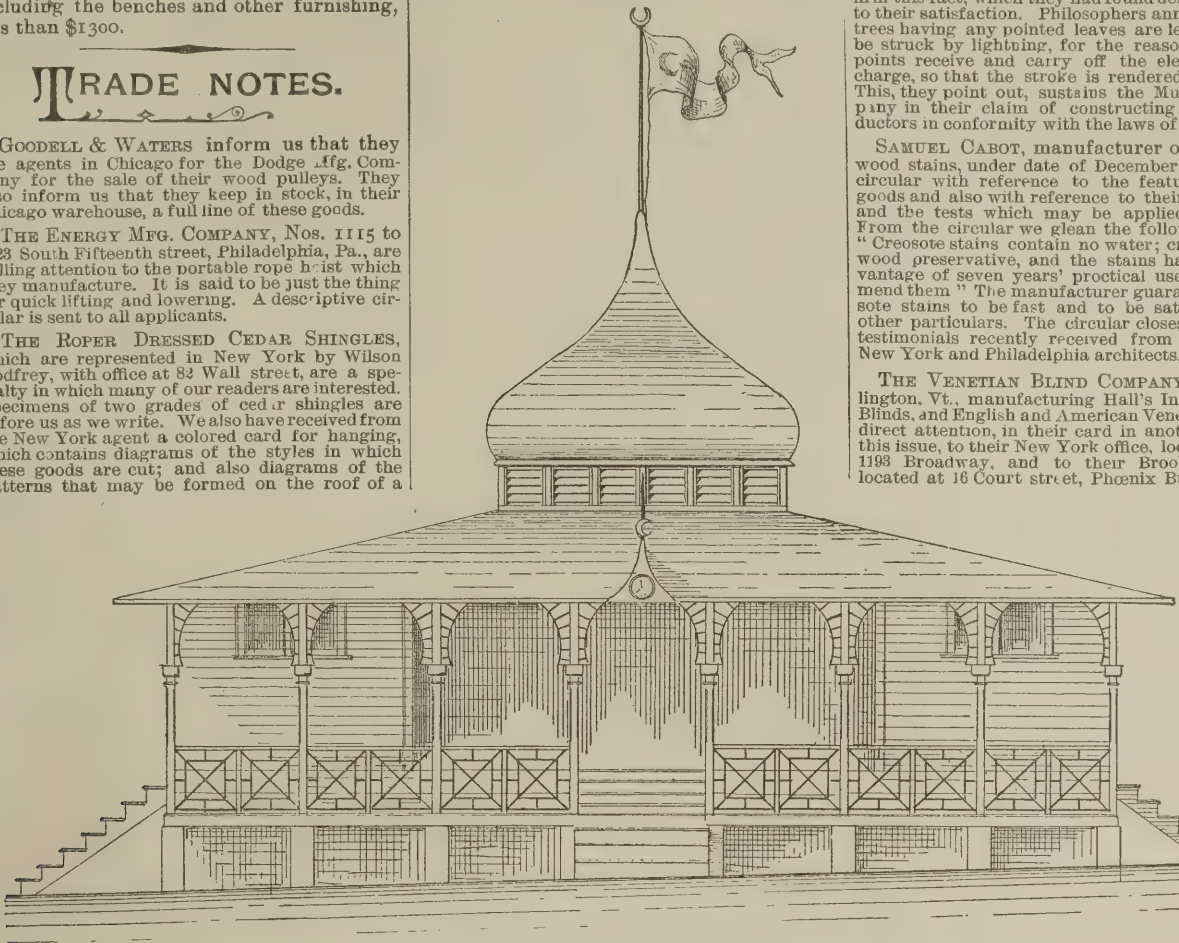
SAMUEL CABOT, manufacturer of creosote wood stains, under date of December 7, issued a circular with reference to the features of his goods and also with reference to their durability and the tests which may be applied to them. From the circular we glean the following facts: "Creosote stains contain no water; creosote is a wood preservative, and the stains have the advantage of seven years' proctical use to recommend them " The manufacturer guarantees creosote stains to be fast and to be satisfactory in other particulars. The circular closes with some testimonials recently received from prominent New York and Philadelphia architects.

THE VENETIAN BLIND COMPANY, of Burlington, Vt., manufacturing Hall's Inside Sliding Blinds, and English and American Venetian blinds, direct attention, in their card in another part of this issue, to their New York office, located at No. 1193 Broadway, and to their Brooklyn office, located at 16 Court street, Phœnix Building. At both of these places their blinds may be seen fitted in place. The company have in press a very fine, new, illustrated catalogue, in which a number of special engravings will appear which will interest our readers.

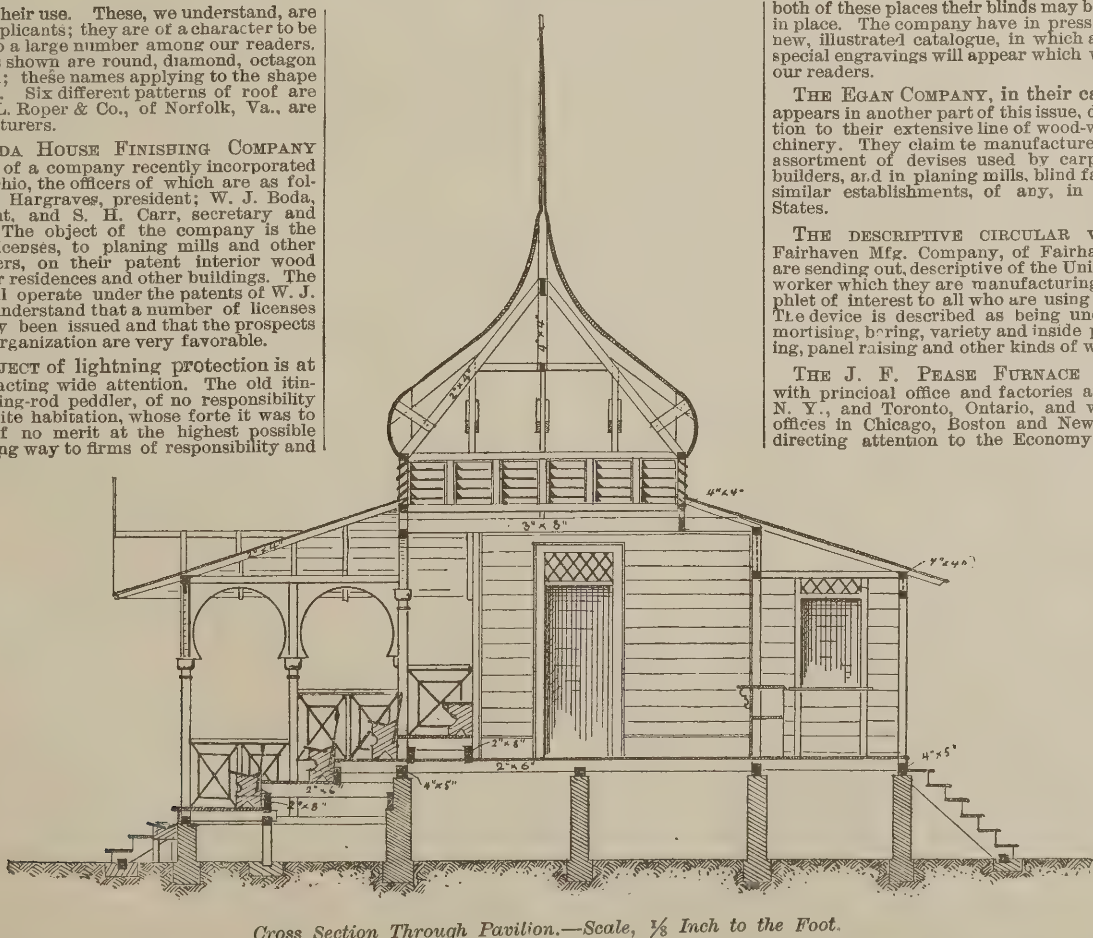
THE EGAN COMPANY, in their card, which appears in another part of this issue, direct attention to their extensive line of wood-working machinery. They claim to manufacture the largest assortment of devises used by carpenters and builders, and in planing mills, blind factories and similar establishments, of any, in the United States.

THE DESCRIPTIVE CIRCULAR which the Fairhaven Mfg. Company, of Fairhaven, Mass., are sending out, descriptive of the Universal wood worker which they are manufacturing, is a pamphlet of interest to all who are using machinery. The device is described as being unexcelled for mortising, boring, variety and inside panel molding, panel raising and other kinds of work.

THE J. F. PEASE FURNACE COMPANY, with principal office and factories at Syracuse, N. Y., and Toronto, Ontario, and with branch offices in Chicago, Boston and New York, are directing attention to the Economy Warm Air Furnace, of which they make a specialty; and also to the Improved Economy Combination Steam and Warm Air Heater. The company issue a 72-page catalogue, which is mailed free on applica



Elevation of Pavilion, Trinidad.—Scale, 1/8 Inch to the Foot.



Cross Section Through Pavilion.—Scale, 1/8 Inch to the Foot.

tion. The cold weather which is now upon us should suggest to builders an inquiry into the working of the heating devices which are offered for approval. By a little attention to questions of this kind, when actual facts can be obtained, a decision will be readily reached as to what is best to purchase when some building is in progress. The advertising matter of this firm is a desirable addition to a builder's reference library.

J. N. Hoague, of Chicopee, Mass., is directing attention to the Draw Knife Chamferer which he is manufacturing. This device is made to fit any size of draw knife, and the gauges are so adjusted by a connecting screw that the tool is under perfect control. The device is very simple and is adapted to be sent by mail.

The Western Mineral Wool Company, of Cleveland, Ohio, and St. Louis, Mo., offer samples and full information to all applicants. Mineral wool is a material that is in general request for fireproofing, frost proofing, sound proofing and other purposes, and has the special advantages of being odorless and indestructible.

The Bridgeport Wood Finishing Company, with manufactory at New Milford, Conn., announce a Chicago office and warehouse at 211 East Randolph street. This company make a specialty of Wheeler's Patent Wood Filler, which is favorably known to a large class among our readers.

The Edward Storm Spring Company, Limited, of Poughkeepsie, N. Y., inform us that they are in receipt of a large number of unsolicited testimonials concerning their safety dumb-waiter. In their advertising space this month they present a letter of recent date from a customer in Philadelpoia, which tells its own story.

The difference between a door protected with an iron storm threshold and one that has no such protection is illustrated in the cut of the trade-mark which appears in the card of the Schenck Adjustable Fire Back Company, 94 Market street, Chicago, Ill. The threshold pieces which they are supplying have had the sanction of a number of years of practical use.

Elevators operated with hydraulic power, also dumb-waiters and other fixtures, are described in the advertisement of George C. Howard, with office at 1787 Barker street, Philadelphia, and 12 H, Cortlandt street, New York.

The National Sheet Metal Roofing Company, of Nos. 510 to 520 East Twentieth street, New York, present in their card, in another part of this issue, the appearance of a roof laid with Walter's standard metallic shingle, and also one laid with Cooper's Queen Anne shingle. Each of these styles are well known to our readers. There is also presented a list of the wholesale agents of the company.

The Silsby Mfg. Company, of Seneca Falls, N. Y., in another part of this issue, illustrate the Comfort steam heater, which they are manufacturing. This apparatus, a sectional view of which is shown by their engraving, is of the vertical, tubular variety, with self feeding magazine. The company also direct attention to portable steam boilers for low-pressure steam heating which they manufacture.

Reiher's transom lifters are widely and favorably known to our readers. Three adjustments possible with this device are illustrated in the card of the manufacturer, F. A. Reiher, 11 and 13 South Canal street, Chicago, which appears in another part of this issue.

James H. Monckton, the well-known writer on stair-building topics, and who for a number of years past has been engaged as an instructor in some of the drawing classes connected with the trade schools in and about New York, has just ready a new work on stair-building and hand-railing, in which he introduces what he describes as the "one plane method." The book is issued by John Wiley & Sons.

The remarkable statement is made by the Cincinnati Corrugating Company, in another part of this issue, that they possess the only iron roofing establishment in the United States operated by steam power. They also refer to the indorsement of their material by leading architects, builders and contractors.

Samples of carvings, manufactured by the Charles W. Spurr Company, 465 East Tenth street, New York, are among the finest machine-made articles that we have ever examined. Their adaptability for decorative purposes becomes evident upon inspection. In another part of this issue the company offer to forward samples on receipt of a nominal consideration. They also refer to the paper veneers, for which they have long been noted.

E. C. Stearns & Co., with offices at 90 Chambers street, N. Y., and 142 Lake street, Chicago, and with factories at Syracuse, N. Y., are directing attention to Warner's Sliding Door Hanger, which they have long been manufacturing and which is already in extensive use. In another part of this issue they publish some testimonials from architects, which are interesting to all who have occasion to use such a device.

We are in receipt of circulars with reference to an international convention and exhibition to be held in Brussels during the present year. Messrs. Armstrong, Knauer & Co. are the authorized agents of the Executive Committee for the United States. Among the circulars which they have recently sent us is the one announcing the sixth competition, being the application of the arts of drawing of plastic and decorative sculpture in the highest and most general sense. In other words, it may be described as an exhibition of contemporary decorative art. The circular contains an appeal to producers urging them to be represented in the exhibition by specimens of their work.

Charles A. Strelinger & Co., of Detroit, Mich., say that "to a thinking man there is nothing more attractive in trade journals than the advertisements. In these are portrayed from time to time the advances made in all kinds of mechanical devices and appliances." In practical exemplification of this idea the firm present in another part of this issue a sample page from a catalogue which they issue, and interesting particulars about their scheme of business.

The Stanley Rule and Level Company, of 29 Chambers street, New York, and New Britain, Conn., whose special tools are known to our readers, far and wide, show in another part of this issue a somewhat comprehensive assortment of novelties, some of which are entirely new, and others of which have the indorsement of long usage. There is no wood-worker among our readers who can afford to pass by such a display of labor-saving devices without ascertaining if there is not something among them that it would pay him to employ in his work.

Cordesman & Meyer, manufacturers of wood-working machinery, Cincinnati, Ohio, report among their more recent contracts the outfit for the factory of L. Puster & Co., chair-makers, Evansville, Ind. This concern was burned out sometime since and has recently been rebuilt and refitted in the best style. We understand from Cordesman & Meyer that their entire works are being operated to their full capacity at the present time.

The Climax Rail Company, No. 134 Water street, New York, inform us that their device is at present in use in over 400 buildings, and that wherever introduced it has given entire satisfaction. The idea upon which it is constructed is to maintain the floor line under sliding doors. The arrangements of parts is such that the partition does not have to be any wider than is used with the old rail; and it can be introduced into old houses as well as put into new. As the door moves along, the rail comes up into place so as to close the opening. The makers also direct attention to the fact that the rail is adapted for elevator doors and for sliding sashes in fine cabinets. An extra heavy pattern is made for large doors in sliding partitions for schools.

The Architectural League gave a reception on Saturday, December 17th, at the Fifth Avenue Art Galleries, 366 Fifth avenue, New York, to Mr. Richard M. Hunt. The occasion proved a very enjoyable one, and there was a large attendance of members and invited guests. The third annual exhibition of the league opened December 19 and continues until January 10. Some very excellent studies are on view.

We have received from the Day Mfg. Company, Detroit, Mich., a copy of their current circular and catalogue. In addition to Day's Self-Heating Bathtub, there is described in the book Smead's Self-Measuring Oil Tank, steam heaters for barber shops and hotel use, range boilers, &c. The pamphlet is one that is of interest to many of our readers, and, we understand, is sent to all applicants.

The Gage Tool Co., of Vineland, N. J., inform us that hemlock knots are used to test plane irons in their establisment. Many of our readers have known hemlock knots with which they have tested the plane irons they are using to act disastrously on the iron. Hence, it is to be inferred that testing plane irons upon hemlock knots before they leave the factory and finding them satisfactory in this respect results in turning out what will prove satisfactory in actual use.

We have received from the Louisville Mantel and Casket Company, of Louisville, Ky., a copy of their current catalogue, being an oblong book with flexible covers, containing numerous illustrations of slate mantels, marbleized iron mantels, &c., which the company manufacture. The designs are given with great care and are accompanied by price lists and specifications of sizes. Near the close of the book a plate is devoted to cast-iron hearths, which the company are manufacturing, being an article that is a convenient and useful substitute for brick and stone, which are largely employed for the purpose.

Catalogue "A," containing 80 pages, with 50 fine wood-cuts, which P. Prybil, of Fortieth street and Tenth avenue, New York, is sending to the trade, is something of general interest. Something new in various kinds of wood-working machinery is contained in it.

A catalogue and price list of bit braces which Amidon & Bastedo, 135 Main street, Buffalo, N. Y., are sending to the trade is of interest to all users of tools of this kind. The Globe Jawed Bit Brace, of which they make a specialty, has many conveniences to recommend it for use.

On the occasion of the placing of the sheet metal figure of Justice in position on the dome of the City Hall, New York, the New York *World* made characteristic comments. From the last sentence it will be seen that Bakewell & Mullins obtained considerable advertising through the medium of this piece of work. It attracted marked attention during the time of erection, and even at present the eyes of pedestrians are cast upward to the dome as they cross City Hall Park: "Justice has once more resumed her vigil on the top of City Hall. Not the old wooden affair, which for so many years threatened to topple down upon the heads of innocent passers-by. That veteran and worm-eaten goddess was retired weeks ago under the length of service law, and was cheered during her first few days in the seclusion of the Corporation yard by a notice of her long and honorable service. The present goddess is of metal, and was assisted to her airy pedestal yesterday by six strong men and a block and tackle. A bar of iron, firmly imbedded in the pedestal, transfixed the figure to the crown, rivets were driven through the feet to the big beam beneath, and the goddess was in place. A balance was placed in her left hand and a sword in her right, and the work was done. Very pretty the goddess looked as the rays of the sun danced about her handsome countenance and immaculate robes. She will keep a constant vigil over the acts of the city's servants until the day when a still younger sister will perch upon the top of the new municipal buildings. City Hall Park was black with people who had gathered to watch the placing of the statue."

The Ellrich Hardware Mfg. Company, of Plantsville, Conn., suggest to mechanics that when they want a good screw-driver, either spiral, ratchet or of the ordinary description, to ask for the Ellrich make, no matter where they buy. They offer to send descriptive price list upon application.

A leveling instrument that will be of interest to our readers is shown in the card of C. F. Richardson, Athol, Mass., which appears in another part of this issue.

The Chicago Mortising Machine Company, 123 West Washington street, Chicago, are directing attention to the Douglass Chain Mortising Machine, a cut of which appears in their card in another part of this issue. They invite the trade to send for circulars and price list.

Many of our readers have the Miller locks in use upon their tool chests, on desks and upon closet doors, and to them the announcement which the company make in another part of this issue will need no commendation. These locks have the advantage of operating without keys and of being unpickable. We have used some of the locks for a number of years past with much satisfaction.

The reader who looks through the advertising portion of this issue can scarcely fail to notice the combined card of the Sagendorph roofing companies, which appears in another column. These companies embrace the home concern, the Sagendorph Iron Roofing and Corrugating Company, of Cincinnati, Ohio, and the following branches: The New York Iron Roofing and Corrugating Company, New York; the East Birmingham Iron Roofing and Corrugating Company, Birmingham, Ala.; the Lloyd Iron Roofing and Corrugating Company, Chicago, and the Missouri Iron Roofing and Corrugating Company, of St. Louis. Each of these has its own special equipment of machinery.

The Fred. J. Meyers Mfg. Company, 429 to 433 Madison avenue, Covington, Ky., are directing attention to iron store fronts, stairs, shutters and other building work, of which they make specialties. They also manufacture wire work of every description, and invite the trade to send for catalogue "C."

The Health Commissioners of the city of New York have issued a pamphlet of some 45 pages, bearing the title of "The Tenement-House Problem." The pamphlet is being circulated for the information of the commission on legislation affecting tenement and lodging-houses, provided for by the laws of 1887. The pamphlet abounds in many facts that are of interest to all students of the problem of housing the working classes in large cities. Numerous plans of tenement-houses are presented, including those which have received prizes in different competitions, and showing the arrangements that were in vogue prior to the effort to reform structures of this kind. There is much in the pamphlet that is of interest to builders and architects wherever situated.

The Stanley Rule and Level Company, of New Britain, Conn., announce that they have just issued a pamphlet entitled "The Woodworkers' Guide," which will be sent free to all applicants. They state that it will be found interesting to all progressive carpenters.

By an oversight the name and address of the inventor and manufacturer of the ladder clutch which was illustrated in the issue of *Carpentry and Building* for December, on page 249, and which is of importance to a great many of our readers, was omitted. The name and address of the maker is W. S. Welch, Westfield, N. J.

W. A. Heath, of Binghamton, N. Y., informs us that he will have completed, at an early date, a number of new machines of great interest to wood-workers. Recent improvements have been made in his well-known Jowel machine and Little Giant planer, which he has had upon the market for some time past. We understand that the establishment referred to is full of orders and that its trade is constantly increasing. We are informed that four Little Giant planers have recently been sent to the State of Maine; one to Florida, and also one to Minnesota.

Messrs. J. A. Fay & Co., the well-known manufacturers of wood-working machinery, Cincinnati, are directing attention to a new Sash Sticking machine that they are introducing, and which possesses special features. We expect to present a cut of this device in an early issue. The occurance of an accident kept it from our columns this number.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME X. NEW YORK, FEBRUARY, 1888. NUMBER 2

NOTES AND COMMENTS.

IN our issue for November last we referred to the action of the Superintendent of Public Instruction of the State of New York in issuing a circular with reference to plans and specifications for schoolhouses. Our readers will recall that the circular in question invited plans and designs for the erection of low-priced school buildings. The object in view was to secure more attractive and comfortable schoolhouses than now exist in the State. According to the information then presented the drawings were to be submitted on or before December 1, 1887, and the competition was limited to architects living or having business offices in the State of New York. A few weeks after the original circular was published the State Superintendent issued an amended communication to the effect that, upon more careful consideration of the subject, it had been determined to remove the limitation which restricted competition among architects residing in or having business offices in the State of New York, and announcing that the competition would be open to all architects who might desire to enter. At the same time the date for closing the competition was extended from the 1st to the 15th of December.

THE decision in this competition was reached early in January. The competition, as our readers will recall, was divided into six classes, the buildings ranging in cost from $600 to $10,000. In all, 58 designs were submitted. According to the report signed by the Committee of Award, many of the studies were so defective in the matter of lighting, heating, ventilating or general arrangement as to preclude the possibility of a favorable consideration. Of those which met with approval several, in the opinion of the committee, were beyond the limit of cost, reckoning material and labor at the lowest market prices prevailing in the State. This conclusion we learn was reached after employing competent experts to compute the exact amount required. Accordingly, these plans could not receive either prizes nor yet honorable mention, which the committee deemed it was permitted to bestow only on designs strictly conforming to the letter of instructions contained in the circulars. Notwithstanding this, the committee assumed the responsibility of mentioning, with special commendation, certain designs excluded because the estimates exceeded the limits, and in doing so indicated their probable cost.

IN the first class—namely, frame buildings to accommodate from 20 to 40 pupils at a cost not exceeding $600—11 designs were submitted. The committee were unanimous in recommending that the design marked "Dotheboys," prepared by William P. Appleyard and Edwin A. Bowd, of Lansing, Mich., should receive the first prize, and that marked "Sax," prepared by John R. Church, of Rochester, N. Y., the second prize. They also designated, with special recommeneation, the designs marked "Nemo," prepared by John Cox, Buffalo, N. Y., and stated that it could probably be erected at a cost of $800. In the second class—namely, frame schoolhouses to accommodate from 40 to 60 pupils, the cost not to exceed $1000—11 designs were submitted. The committee recommended that the designs marked "Dotheboys," prepared by the same persons as named above, should receive the first prize, and that those marked "Sax," also submitted by Mr. Church as named above, the second prize. They also specially commend the design marked "La Moderne," prepared by C. Powell Karr, of New York City, and stated that this design could probably be erected at a cost of $1200. We understand that this design has attracted particular attention upon the part of all concerned in the competition, and that scale drawings and details of it have been ordered to be prepared at the expense of the commission. We are informed that this design was the choice for the first prize in this class until the limit of cost was ascertained to be such as to exclude it.

IN the third class, which comprised frame schoolhouses to accommodate from 60 to 100 pupils in two rooms, the cost not to exceed $1500, seven designs were submitted. The design marked "Walnut," prepared by J. C. A. Harriott & Co., Albany, N. Y., was recommended for the first prize. No second prize in this class was awarded, but the design marked "Nutmeg," prepared by Warren R. Briggs, Bridgeport, Conn., was declared worthy of special consideration, and the statement was made that it could probably be built for $2000. In the fourth class—frame schoolhouses to accommodate from 100 to 120 pupils in two rooms, the cost of the building not to exceed $2500—11 designs were submitted. The design marked "Dotheboys," the authors of which have already been named, received the first prize, and that marked "Sax," by Mr. Church, as mentioned above, the second prize. The design submitted by "Nutmeg," the name of the author also having been given above, was deemed worthy of special commendation. The probable cost of the building in this case was named as $2800. In the fifth class—frame or brick buildings to accommodate from 120 to 175 pupils in three rooms at a cost not exceeding $5000—six designs were submitted. No prizes were awarded in this class, but special commendation was given to the design marked "Nutmeg," which it estimated would cost $6600 to build, and to that of "I. D. K.," prepared by Fenimore C. Bates, Cleveland, Ohio, which it was estimated would cost $6900.

IN the sixth class—brick buildings to accommodate from 175 to 250 pupils in four rooms, with an exhibition hall, the cost not to exceed $10,000—12 designs were submitted. In this class, also, no prizes were awarded. The design marked "Nutmeg," estimated to cost $13,000, was especially commended, and also the one marked "W. W.," prepared by Proudfoot & Bird, Wichita, Kan., which was estimated to cost $16,500. The conclusion of the report of the committee expressed the gratification of the members at the general excellence of the designs submitted. Many of them, it is asserted, present real artistic merit, combined with a practical knowledge of the needs of schools. The important matters of light, ventilation and sanitation, we are assured, received a consideration truly gratifying. The mechanical excellence of the drawings, we are informed, materially lightened the labors of the committee. It is somewhat significant that the list of awards in this case shows that New York is obliged to share the honors in this competition, in most generous measure, with other States. Michigan, Connecticut, Kansas, Ohio, and, taking into account the residence of one of the competitors, New Jersey, have carried off their fair share of credit as well as prize money. Several of the competitors named above are old acquaintances of the readers of this paper.

AN organization among the manufacturers of cypress shingles was effected in New Orleans early in January. The name selected was The Southern Shingle Association, and its membership includes shingle manufacturers and wholesale dealers in shingles. The secretary is to keep a statistical account of the shingle business, and the Board of Directors are to establish standards, or grades, and classifications, and also general rules of trade. At the meeting in question three leading grades were established, known as Best, Clears and Prime, and two subordinate grades to be known as A*s and Clipper. Sixteen inches was adopted as the standard length, and the butts of five shingles are to measure 2 inches. In the above grading the Bests are bundled separately by widths; the Clears have random widths, and are all heart and sound 10 inches from the butts. In the Primes each width is separately bunched; but light knots and sap free from "shakes" or other defects are admitted. A*s are the same as Primes, except that random widths are allowed, and shingles 14 inches

are permitted. Clippers admit anything worth packing not in the above brands. Eighteen-inch shingles are permitted where necessary to supply orders.

WHAT was formerly a waste material is, in many cases, at the present time a valuable product. To convert a waste material into a saleable article there is frequently needed only a little inventive ingenuity with respect to packing and shipping it or adapting it to the market. This general truth has been exemplified by an effort that has been made in some portions of the State of Maine to take care of the large accumulations of sawdust about the lumber factories. The sawdust is being pressed into convenient sizes and inclosed in burlaps. In this form we learn that the material can be shipped to market for less than one-half of the cost of shipping in bulk. We are informed further that the new enterprise has received considerable encouragement, and that in various directions there is a demand for sawdust in this form. It would seem reasonable to suppose that for the future baled sawdust about the stables, in cities particularly, would be in much demand. Every one knows the advantage of keeping hay in bales as compared with the loft room that was necessary for hay in bulk formerly, and the same arguments apply, in part at least, to sawdust. The amount of sawdust that is available for the purpose of baling, taking all the lumber regions of the United States into account, is very large. The percentage of lumber that is turned into sawdust in cutting is the evidence of the large quantity of this material that exists. It would seem that the new industry might extend to large proportions.

IT is intimated in Chicago that the coming building season is casting a shadow before it in the shape of a renewal of the demands of the workingmen who were defeated last season in their attempt to secure higher wages and shorter hours. This excludes the bricklayers, who feel bound by the results of the arbitration which was had in their case, also the gas-fitters, who have a contract with their employers which they will respect, and the stone-cutters and stone-handlers, who are also expected to abide by the terms of a contract made some time since, but it includes almost all other classes of workingmen employed in the building trades. The following scale has been printed in the Chicago daily papers as embodying a portion of the demands which will be made: Carpenters, 35 cents an hour for eight hours' work. Cornice-makers, eight hours to constitute a day's work at $2.50; regulation of the apprentice system; no shop employing less than 30 men to be allowed more than two apprentices. Painters, eight hours' work at 37½ cents an hour. Slate roofers, eight hours' work at 35 cents an hour. Lathers, eight hours' work at $3 a day. Hodcarriers, eight hours' work at 30 cents an hour. The tin and sheet-iron workers will present their claims for an adjustment of rates to the Builders' and Traders' Exchange in a few days. The scale decided upon by the workingmen will average an advance of over 10 per cent. on that of last season. It is stated on the part of the employers that it is not likely that they will accede to these demands—at least not without a struggle. There was no feeling of amity between the employing carpenters and their men after their trouble of last summer, and the feeling at present is of the same nature. The master carpenters is the strongest element in the Builders' and Traders' Exchange hall. That body is likely to oppose the journeymen as radically as ever. Should the action of the masters be against accession a general strike in the building trades will probably be set for May 1. This will be a most unfortunate occurrence for the Chicago building trades and allied interests.

DESTRUCTIVE thunderstorms occur so seldom during the winter that it may seem out of place to speak of them at this season of the year. The means of protection against lightning is, however, a subject of considerable importance, and one that is so little appreciated and understood, that it is well to call frequent attention to it. During the summer months the successive thunderstorms are a sufficient reminder of the dangers of lightning, but in the winter people naturally forget that such dangers ever exist, unless they are especially called to mind. Lightning-rods are far from being a new invention, but it is nevertheless only recently that much study has been given to improving their forms and methods of application. Both in France and Germany, within a year or two, a good deal of statistical information has been collected concerning the occurrence of thunderstorms and fatalities arising from lightning strokes. The function of lightning-rods is to assist in bringing the earth and the atmosphere into a state of electrical equilibrium. If the air is surcharged with electricity, the rods convey the surplus to the earth, both by a gradual conduction, and also at times by guiding the electricity when it breaks from the clouds in the form of a flash of lightning. This same result is also accomplished, but in a less efficient way, by trees, rocks and other projecting points. When the earth is surcharged the action is reversed, for then the lightning-rods, trees, church spires, &c., carry up the electricity and empty it into the clouds, thus helping to restore the equilibrium. Electricity discharging from the earth to the air as a flash is a phenomenon not very often seen, nor is the danger from it accurately realized, and in fact so little is known about such occurrences, the laws governing them and the effects they produce, that the mere statement of the fact is about all that can be safely said about them.

The Chicago Builders' and Traders' Exchange.

The builders of Chicago and those engaged in allied trades maintain an organization known as the Builders' and Traders' Exchange, having its headquarters in the National Life Building, 159 La Salle street. The annual meeting of this body occurred on the 16th ult., President George Tapper in the chair. The report of the secretary, James John, showed the receipt of $9924 during the year, of which $7315.50 was from annual dues. Against this was expended $10,253.40, of which $1165 was for the National Association and $332.57 for strike expenses. The amount on hand January 16, 1888, was $9,857.88, and the total assets of the exchange aggregate $13,729.92. The membership is 511, a net gain of 13 during the year. The greater part of the afternoon session was occupied in casting the ballots for the election of officers for the ensuing year, over which there was a spirited contest.

A meeting was held in the evening to hear the result of the election and for the transaction of other business. The secretary read the call and prospectus of the National Convention of Builders, to be held in Cincinnati early in February. The president announced the following list of delegates to this convention: George Tapper, T. G. McCarthy, William Goldie, F. Gindele, Adam Weckler, Joseph Downey, M. Benner, C. A. Paltzer, James John, M. Campbell and George C. Prussing, delegate-at-large, being a vice-president of the National Association. Opportunity was given for instructions and suggestions to the delegates and D. V. Purington asked that steps be taken to secure uniformity in the size of brick. Mr. Prussing then read from advance copies of the National Committee reports upon subjects to be discussed at the coming meeting. The report on apprentices was considered at some length, the members generally advocating the system of manual training it suggested, while varying as to whether it should be taught in the public schools or in private institutions. At this point the inspectors of election came in and were received with applause. The list of officers elected was as follows: President, George Tapper; first vice-president, F. Blair; second vice-president, M. Madden; treasurer, Joseph Downey; secretary, J. A. Pettigrew; directors, F. S. Wright, W. H. Iliff, E. A. Thomas, E. A. Wells, and Thomas Moulding; inspectors of election for 1889, George Rice, G. B. Schefler, and C. C. Bishop.

President George Tapper was re-elected over Matt Benner by a vote of 165 to 116. Joseph Downey, being on both tickets, was re-elected treasurer by a vote of 279, three other persons receiving one vote each. James John, the present secretary, was defeated for re-election by J. A. Pettigrew by a vote of 113 to 112. President Tapper was introduced by Mr. Benner, and made a speech, as did also the other principal officers when their elections were announced. At this point a protest was read against counting the votes for J. A. Pettigrew for secretary, signed by James John, the present incumbent of the office. His point was that Mr. Pettigrew was not a member of the association, being only a member of a firm holding a membership. Considerable discussion ensued, and it was shown that other officers-elect were members in the same way. The communication was finally tabled, and Mr. Pettigrew was declared elected. The further discussion of the proposed resolutions was deferred to another meeting.

THE PLATES.

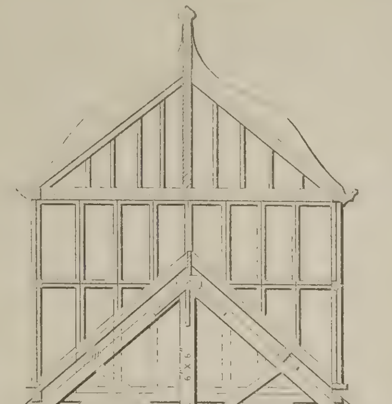
Plate V is devoted to a perspective view of the Snyder County Prison, Middleburgh, Pa., built about a year since to plans prepared by J. F. Stettler. Sections and floor plans of this structure are given in the text pages.

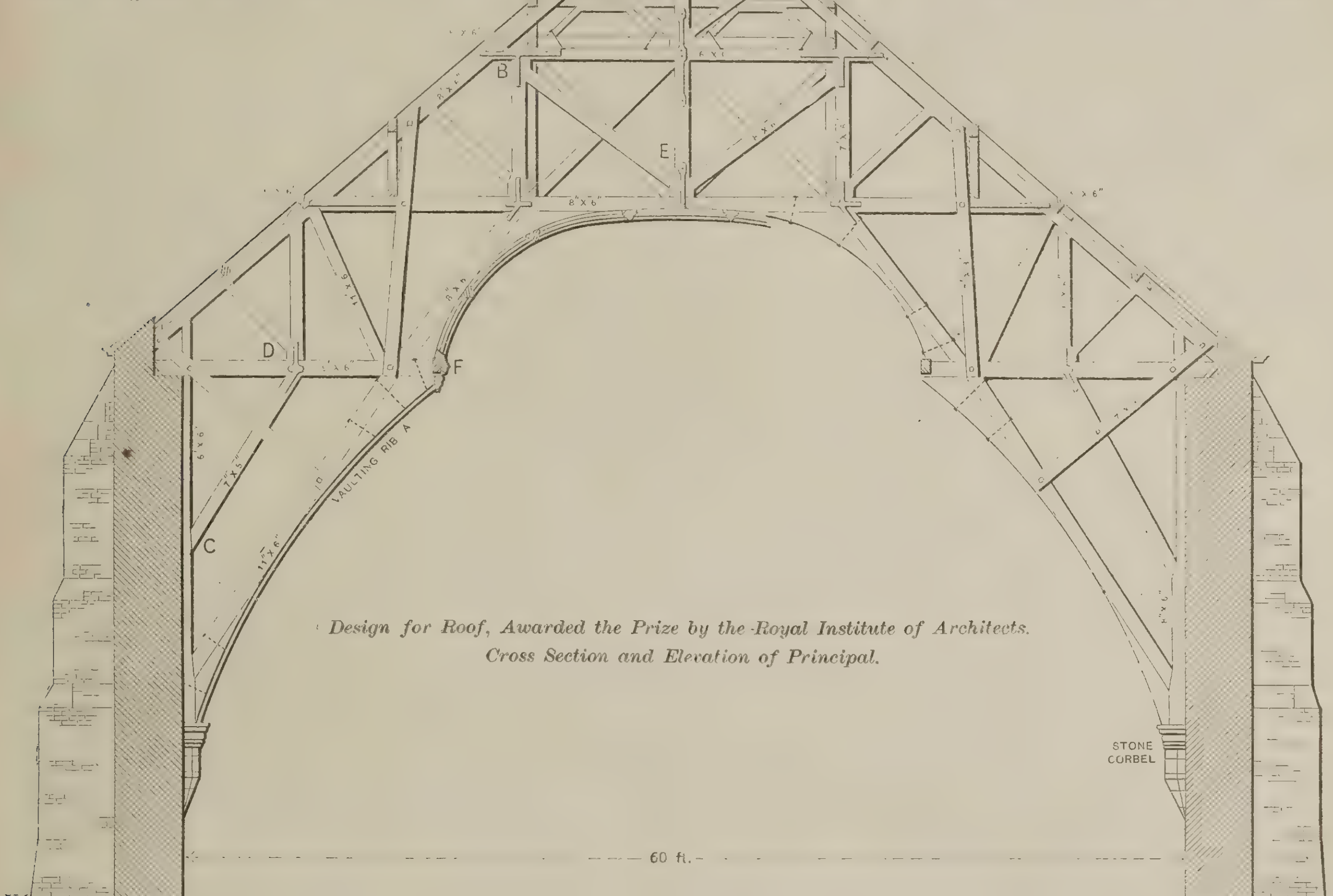
Plates VI and VII are devoted to a group of designs, all having a certain relationship and fitness of association. The large cut represents a hard-wood mantel, designed and built by Hegan Brothers, Louisville, Ky. A floor designed is presented near the top of Plate VI by R. Fischinger. The other engravings upon these plates relate to forms of coal boxes and coal vases, which are elsewhere described in this issue.

Plate VIII is devoted to the front and side elevations of a house study by W. G. Mumma, Warrensburg, Mo. Floor plans and details are presented in the succeeding pages of text.

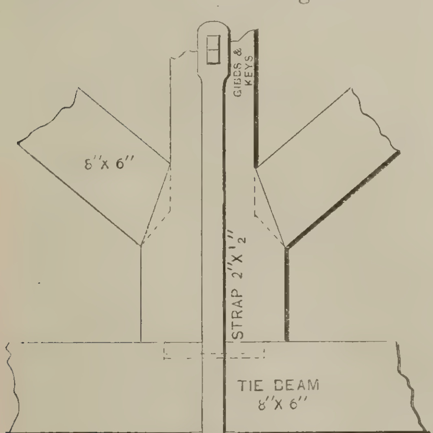
Design for a Roof.

For some time past the Council of the Royal Institute of British Architects has offered an annual prize of 10 guineas, together with a gold medal, for certain designs. Thus a regular competition, open to students of architecture and building year after year, has been constituted. The prize in question, a year since, was awarded to Mr. James Strong, of Liverpool, the subject being a design of a roof over a railway station of 60 feet span, the roof being sustained without floor supports. The specifications required that wood construction, without iron ties, should be employed, and that there should be a central lantern light. The hight of the walls was given as 40 feet. Thinking that this general subject would be of interest to our readers, we present a scale drawing of the roof, together with details of the different parts. In the illustration the lower part of the walls is omitted. It occurred to us on examining these drawings that the omission of iron ties, and the specification that the roof should be constructed of wood, was causing young men to give attention to these features of construction which are, in a measure, outdated by the extensive introduction of iron in roof work. If our readers will take the trouble to compare what is here presented with any new building of a similar character recently built in this country, they will be impressed, we think, with the heaviness of what is here shown, as compared with the airy lightness of current American practice. Nevertheless the study presented contains many useful lessons, and the individual joints shown are of interest to our readers, whether the roof as a whole is used or not.

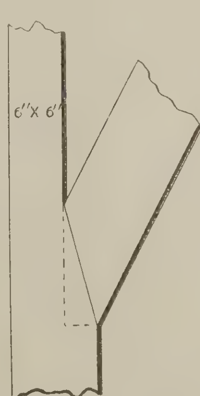




Design for Roof, Awarded the Prize by the Royal Institute of Architects.
Cross Section and Elevation of Principal.



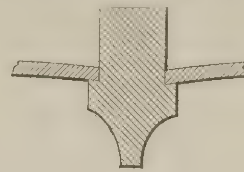
Detail of Scantlings, E in Elevation.



Detail at C.

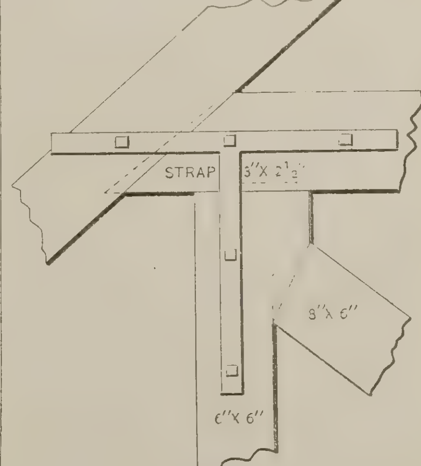
Fire-Bricks.

Mr. W. Y. Dent, in a lecture before the British Society of Arts on building materials, gave an account of some of the chemical problems involved in the constituency of fire-clay and fire-bricks. From it we take the following:



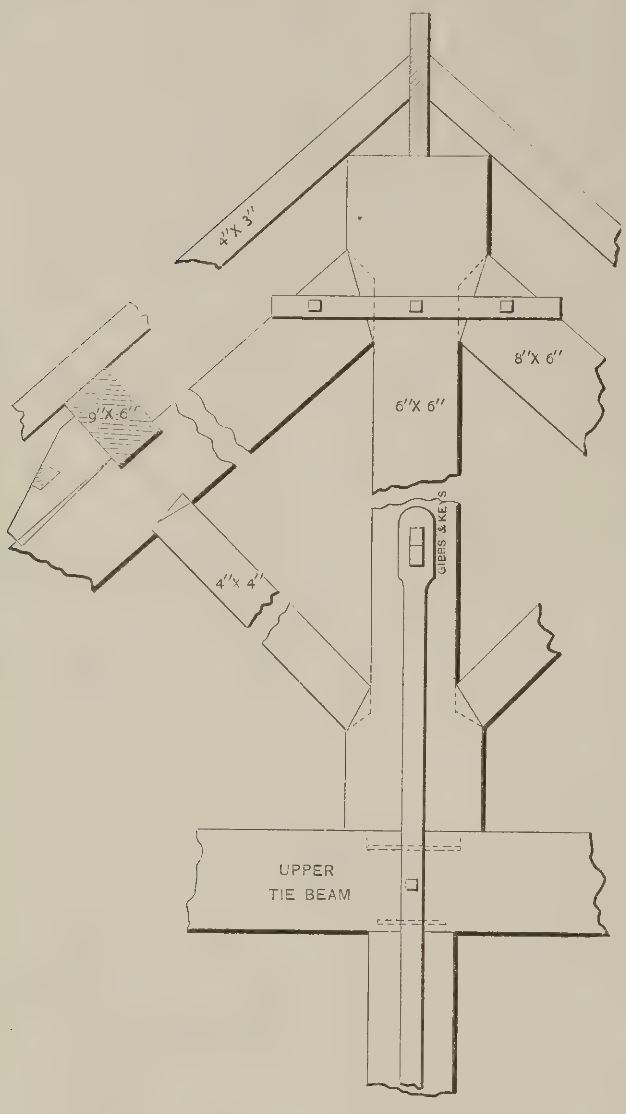
Vaulting Rib.

The plastic clays consist of silica and alumina, chemically combined with water. They are hydrated silicates of alumina, the plasticity depending upon the water that enters into their composition. The water with which the clay is chemically combined can be expelled at a temperature a little above that of boiling without detriment to



Detail at B.

its plasticity, but the whole of the water contained cannot be driven off without raising the temperature to dull redness. Silica, alumina and lime are separately very infusible substances, and are capable of resisting exposure to very high temperatures without softening. It is on account of its

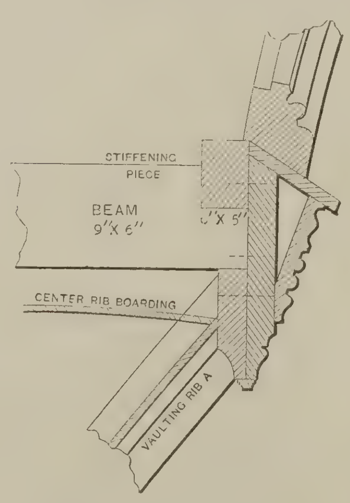


Design for Roof.—Part of King Post.

extreme infusibility that lime is found to be the most suitable material for the cylinders upon which the oxyhydrogen flame is made to impinge to produce a brilliant light, the intensity of the light being due to the extremely high temperature to which the lime is raised. Lime, however, from its want of cohesion, could never be brought into general use for such purposes as fire-clay is employed, and this is also the case as regards silica, which requires the addition of some substance of a basic character, with which it will unite, and so cause the particles to bind together.

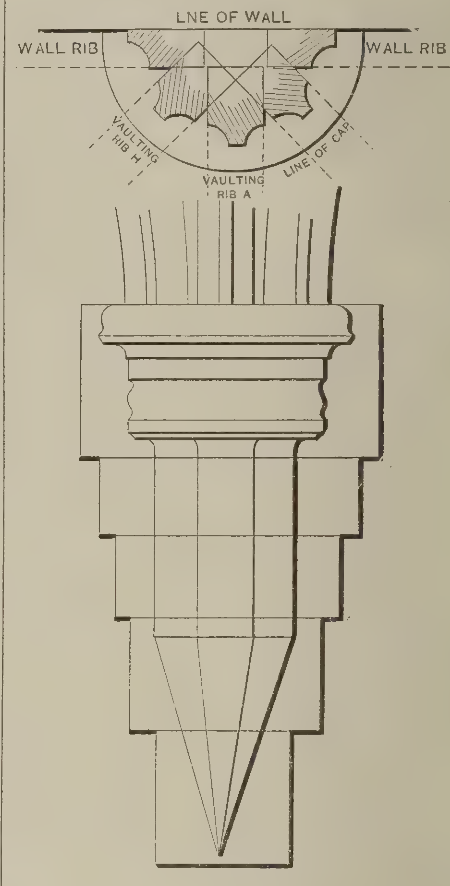
The nearest approach to the use of silica alone as a fire-brick is in the case of the Welsh brick, made from the Dinas rock in the Vale of Neath. This material, before being made into fire-bricks, had long been used for repairing the furnaces at the copper works of South Wales, for which purpose its peculiar property of expanding when subjected to the influence of a high temperature, instead of contracting as in the case of some other fire-clays, renders it particularly suitable, the cementation of the bricks being facilitated by the increase of temperature. This Dinas rock occurs in various conditions, from that of a firm rock to that of disintegrated sand, and a mixture of about 1 per cent. of lime is, therefore, necessary in order to make it into bricks. Dinas brick will stand very high temperatures, but are more friable than ordinary fire-bricks, and will not resist to the same extent the action of basic substances, such as furnace slags, containing much oxide of iron. They are, besides, porous and readily absorb moisture, rendering it necessary for furnaces built of them to be gradually heated, as they are liable to crack if sufficient time is not allowed for driving off the moisture. The composition of the clay used for fire-bricks is a question of great importance, inasmuch as its quality depends greatly upon its chemical constituents, although its power of resisting fusion when exposed to intense heat is affected by its mechanical condition. The same materials, when mixed together in the form of a coarse powder, will require a higher temperature to fuse them than would be the case if they were reduced to a fine state of division. The qualities required in fire-bricks are that they should bear exposure to intense heat for a long time without fusion; that they should be capable of being subjected to sudden changes of temperature without injury, and that they should be able to resist the action of melted copper or iron slag. The Dinas brick, which contains 98 per cent. of silica, will bear exposure to a higher temperature than most others, but it will run down sooner when in contact with melted iron slag.

Ganister is the name given to a fine grit which occurs under certain coal beds in Yorkshire, Derby and South Wales, and the black ganister from the neighborhood of Sheffield is especially adapted for lining cupola furnaces, owing to its capacity to stand high temperatures without shrinking,



Finish at F in Elevation.

in consequence of the large quantity of silica it contains. Fire-bricks made of silicious clays from granitic deposits in various parts of Devonshire also contain a large proportion of silica, but their powers of supporting exposure to high temperatures are materially increased by the coarseness of the particles of disintegrated granite, of which they are composed. The material employed for the Dinas bricks, as well as the others mentioned, differs considerably in its character from what is ordinarily understood by the term fire-clay, as used in the manufacture of the celebrated fire-bricks of Blaydon Burn, Stourbridge or Glenboig, the quality of which, as regards their chemical composition, depends upon



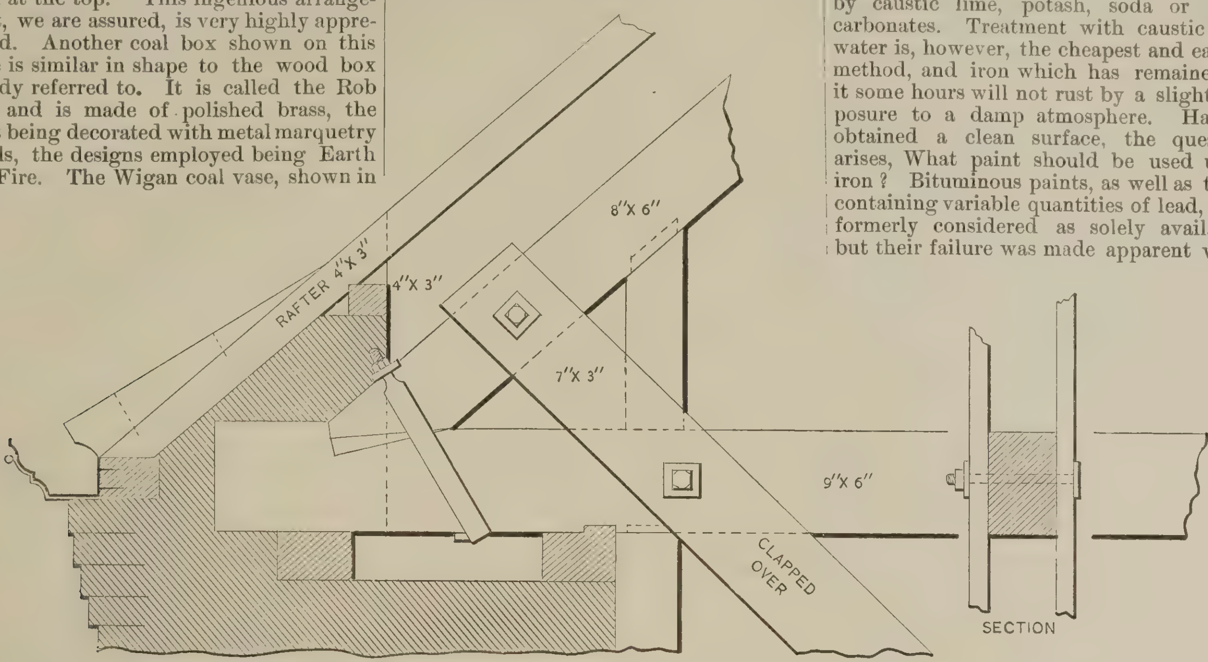
Corbel.

the relative portions of silica and alumina, and their freedom from iron oxide and alkaline salts, the presence of which tends to render the clay more fusible.

Novelties in Coal Boxes.

We have on different occasions directed attention to a certain class of coal boxes which are in use in Great Britain, but which, so far as we are informed, have not been to any great extent introduced into the United States. Current issues of the furniture papers and architectural journals published on the other side contain illustrations of new designs of this class of goods, which have been brought out for the season's business. A few of these we think will interest our readers, particularly because they suggest styles and constructions which it would seem advantageous for some one to introduce upon this side of the water. One of the designs shown in Plates VI and VII is called the Malvern. It is a typical example of the wood coal box of the kind to which attention has just been directed. It is mounted with substantial brass fittings, and the lid is embellished with highly effective carving. The larger engraving on Plate VI shows a more ambitious form, and one which we think is altogether a novelty on this side of the water. It is known in the catalogue as the Scarborough. As will be seen, it is in the form of a handsome three tier What-not, having square columns. The front panel of the coal box proper is suitably relieved with carving. This would seem to be an excellent piece of furniture

and something that can hardly fail to meet the public taste. We learn from the trade matter published in our English exchanges that many of the wood coal boxes of this form the present season are fitted with folding doors so adjusted as to readily open by the mere act of pushing back the handle fixed at the top. This ingenious arrangement, we are assured, is very highly appreciated. Another coal box shown on this plate is similar in shape to the wood box already referred to. It is called the Rob Roy, and is made of polished brass, the front being decorated with metal marquetry panels, the designs employed being Earth and Fire. The Wigan coal vase, shown in Plate VII, is a novel shape, and is in every respect very much more desirable for use than the conventional coal hod of the American market. It has a beautifully embossed front and is handsomely finished. The handle falls down back of the vase, as shown in the cut. A place for the shovel is also provided. The engraving above it represents still another novelty of the same class made in metal, and is in the form of a tipping vase swung in an iron stand. The vase itself is made of copper, and has a very ornate front. The stand is of iron. We are assured that the effect of this design is very excellent, the happy blending of the two metals being pleasing in every respect.

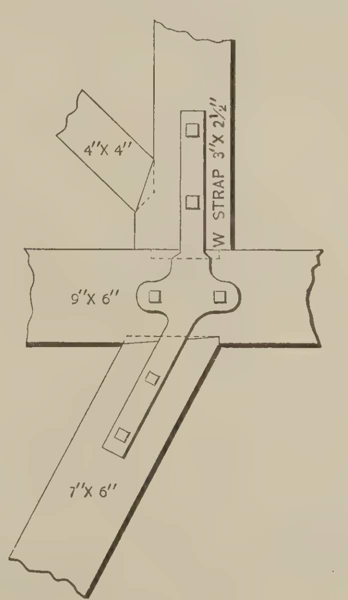


Design for Roof.—Section at Eaves, Showing Foot of Principal.

Painting Ironwork.

The question of painting Ironwork is a matter of considerable importance, whether considered from the standpoint of the roofer, or the manufacturer of cast-iron structures, or the use of iron beams in building work. The following article, which appears in one of our exchanges, contains some facts in regard to painting ironwork, which are undoubtedly worthy of attention. The subject is very carefully considered with reference to the reasons for the processes employed. The writer says:

Cast and wrought iron behave very differently under atmospheric influences, and require somewhat different treatment. The decay of iron becomes very marked in certain situations, and weakens the metal in direct proportion to the depth to which it has penetrated, and, although where the metal is in a quantity this is not very appreciable, it really becomes so when the metal is under ¾ inch in thickness. The natural surface of cast iron is very much harder than the interior, occasioned by its becoming chilled, or by its containing a large quantity of silica, and affords an excellent natural protection, but should this surface be broken rust attacks the metal and soon destroys it. It is very desirable that the casting be protected as soon after it leaves the mold as possible, and a priming coat of paint should be applied for this purpose; the other coats thought requisite can be given at leisure. In considering the painting of wrought iron it must be noticed that when iron is oxidized by contact with the atmosphere two or three distinct layers of scale form on the surface, which, unlike the skin upon cast iron, can be readily detached by bending or hammering the metal. It will be seen that the iron has a tendency to rust from the moment it leaves the hammer or rolls, and the scale above described must come away. One of the plans to preserve iron has been to coat it with paint when still hot at the mill; and, although this answers for awhile, it is a very troublesome method, which ironmasters cannot be persuaded to



Detail at D.

adopt, and the subsequent cutting processes to which it is submitted leave many parts of the iron bare. Besides, a good deal of the scale remains, and until this has fallen off or been removed any painting over it will be of little value. The only effectual way of preparing wrought iron is to effect a thorough and chemical cleansing of the surface of the metal upon which the paint is to be applied—that is, it must be immersed for three or four hours in water containing from 1 to 2 per cent. of sulphuric acid. The metal is afterward rinsed in cold water, and, if necessary, scoured with sand, put again into the pickle, and then well rinsed. If it is desired to keep iron already cleansed for a short time before painting, it is necessary to preserve it in a bath rendered alkaline by caustic lime, potash, soda or their carbonates. Treatment with caustic lime water is, however, the cheapest and easiest method, and iron which has remained in it some hours will not rust by a slight exposure to a damp atmosphere. Having obtained a clean surface, the question arises, What paint should be used upon iron? Bituminous paints, as well as those containing variable quantities of lead, were formerly considered as solely available, but their failure was made apparent when the structures to which they were applied happened to be of magnitude, subjected to great inclemency of weather, or to constant vibration. Recourse has, therefore, been had to iron oxide itself, and with satisfactory results. A pound of iron oxide paint, when mixed ready for use in the proportion of two-thirds oxide to one-third linseed oil, with careful work should cover 21 square yards of sheet iron, which is more than is obtained with lead compound. Oxide of iron paint endures a very great heat without material alteration, and keeps both its color and preservative qualities well. There is this difference to be noticed between painting of iron and wood—that with the former when the painter comes to spots of rust that cannot be removed he should endeavor to incorporate them with the paint rather than paint over them. The repainting of iron involves carefully washing down and removing all dust, dirt, and so on, from the entire surface, every particle of rust being scraped and chipped off, the work receiving from two to four coats in oil properly applied. The real value of any paint depends on the quality of the linseed oil, the quality and character of the pigment and the care bestowed on grinding and mixing, and, as all this is entirely a matter of expense, cheap paints are not to be relied upon.

We are in the habit of regarding the Egyptian obelisk as almost without precedent in the way of size of single stones, and yet it occasionally happens that modern quarrying operations produce stones of as great a size. A very large stone was recently taken out of the Bodwell quarries, at Vinal Haven, Me., a short time since, that is an illustration in point. A local paper, after making the assertion that it is the largest stone ever quarried in the vicinity named, adds that, if erected, the gigantic shaft would be the highest, largest and heaviest single piece of stone now standing, or that ever stood, so far as there is any record. According to this authority, it considerably exceeds in length any Egyptian obelisk. The shaft in question is 115 feet long, and 10 feet square at the base. Its weight is estimated at 850 tons.

Course in Pattern Making, Sibley College, Cornell University.

In our January issue we presented a portion of the illustrations of a course in pattern making in use in Sibley College, Cornell University, Itacha, N. Y. At this time we present another installment of the cuts. The reader will remember that, referring to Fig. 18, the last illustration presented on the former occasion, we stated that the piece of work shown was excellent in its way for practice, and that the product resulting from such work is always sure to be useful. The piece in question, representing a T-joint in pipe, is one of the best exercises in nice cutting and fitting and brings into play a great many points of practice. The pattern is so small and thin that only good work can make sure of a good casting. These same remarks apply to even a greater extent to the next illustration in the course shown in Fig. 19, presented herewith. In it the two axial lines of the casting are to be set at an angle of 60° exactly. In the next figure is a sketch of the core-box used in this work. The reader will recognize that these are excellent bits of practice in drawing for tyros in the art; but the same system of carefully graded instruction in drawing classes brings the novice into working shape with remarkable rapidity. The exercises here shown were made by the drawing classes after two or three weeks' work on lines, angles and circles and their various junctions. The next two Figs., 20 and 21, show methods adopted for making the patterns for two forms of eccentric, both of which are later on utilized in the work of the machine shop in the institution in question. They call attention to the necessity of careful choice of the right plane along which to make the pattern "part," and give good practice in the use of the snap-flask. Pieces 24 and 25 are the pattern and core-box for a hollow sphere having four openings into it, the holes and the interior being made by the use of a single core, made in the core-box as shown. The finishing of this piece is one of the most useful exercises in the course in machine work.

(To be continued.)

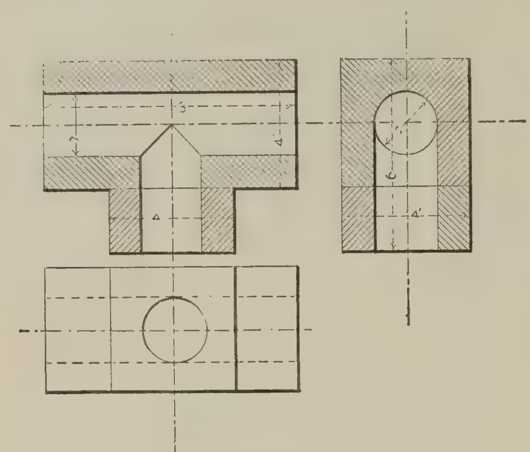


Fig. 19.

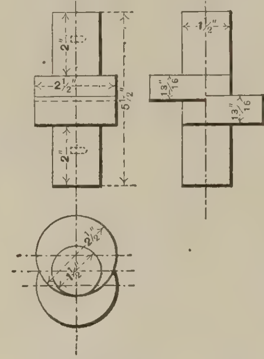


Fig. 23.

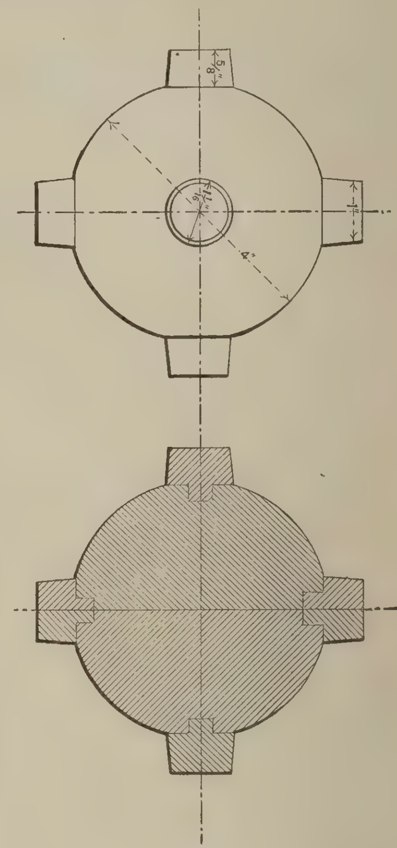


Fig. 25.

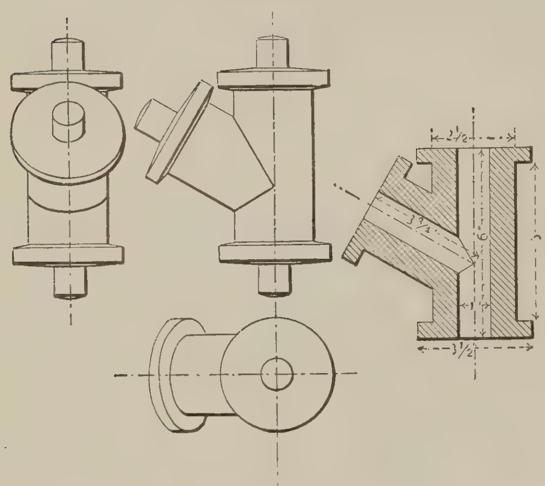


Fig. 20.

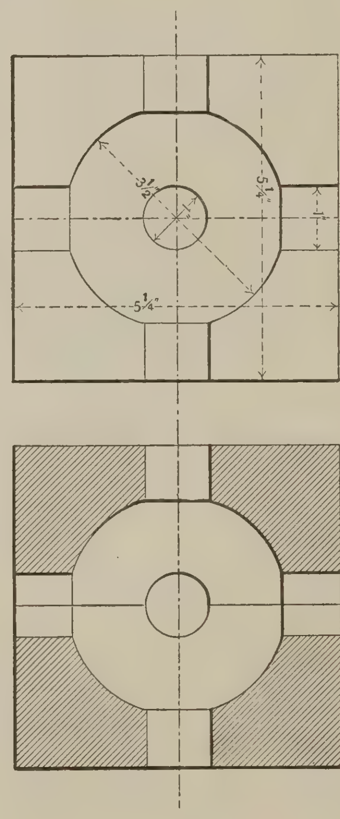


Fig. 24.

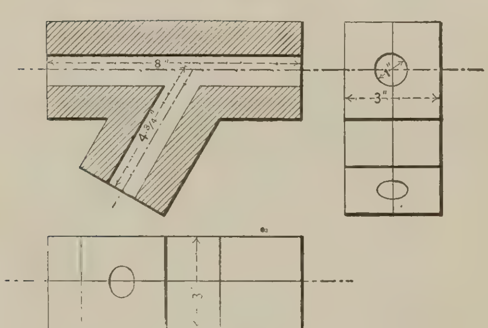


Fig. 21.

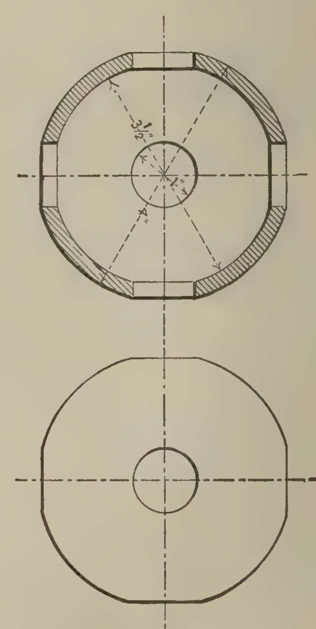


Fig. 26.

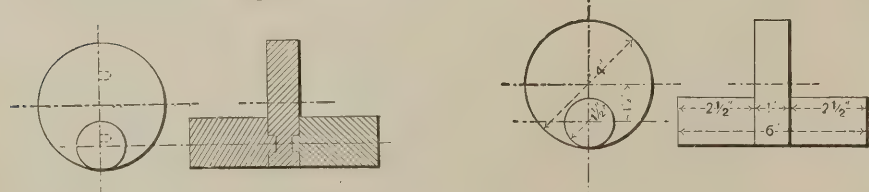


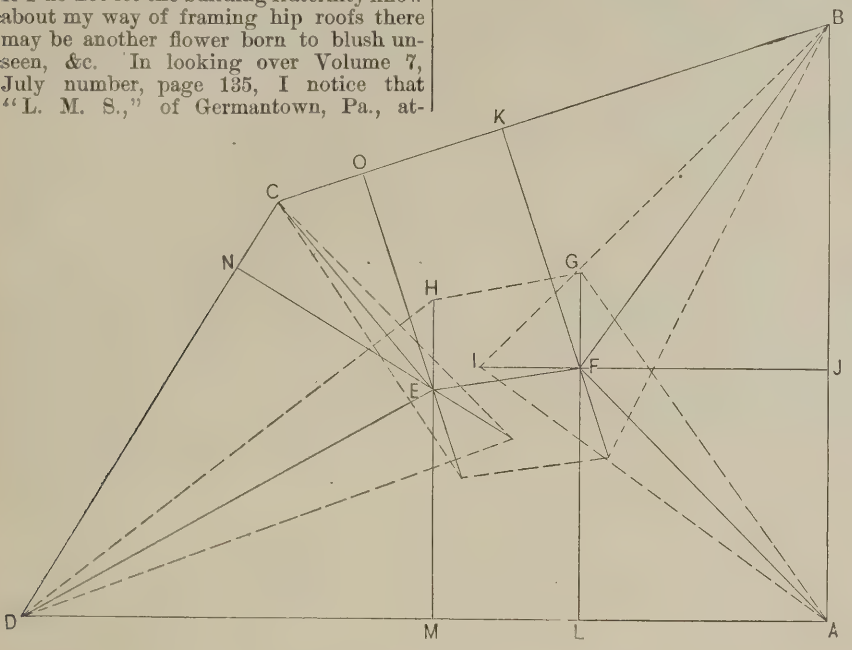
Fig. 22.

Diagrams Illustrating Part of the Course in Pattern Making, Sibley College, Cornell University, Ithaca, N. Y.—Scale, 2 Inches to the Foot.

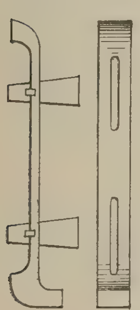
CORRESPONDENCE.

Framing Hip Roofs.

From T. D. G., *Council Bluffs, Iowa.*—If I do not let the building fraternity know about my way of framing hip roofs there may be another flower born to blush unseen, &c. In looking over Volume 7, July number, page 135, I notice that "L. M. S.," of Germantown, Pa., attempts to clearly and emphatically expound the principles of the art to the readers in general, and to your Rockford, Ill., correspondent in particular. Now, I am inclined to favor the latter gentleman; for, if he has not shown as much as the other, he did his work correctly, which is more than can be said of "L. M. S." Referring to the latter, I think his bevel C is shaky, and that his backing problem is a disastrous failure. I like his method of getting lengths and bevels of the jack rafters; however, "B. C." shows the same thing. The reason why I criticise the bevel C for hips is because they do not fit the side of the deck or ridge pole. The bevel would be all right if the hips were first backed correctly and the bevel applied on the top from each side to straddle the corner. I have repeatedly inquired for information on framing octagonal roofs, but have never obtained anything of this kind. Of myself, I have developed the following method for obtaining lengths and bevels of rafters for any form of roof. Referring to the sketch inclosed, A, B, C, D represents the plan of a roof, being the plate lines. The rise of the roof is equal to the run —in other words, it is half-pitch. E F is the ridge; O F, B F, C E and D are seats of the hip rafters. J F, K F, L F also M E, N E and O E are the seats of common rafters. Now, beginning at the end of the roof, A F B, we have to extend the line of the common rafter J F to I, J I being the length of the common rafter at that point. We then connect A I and B I, which will be the shape of the roof for that end of the building. The dotted lines in the other portions of the diagram indicate the shape of the other sides of the roof obtained in same general way. The ridge in the case will not be level because the run is less to E than to F. This study has developed the following rule: To get the lengths of hips, take the length of common rafter and the distance from first common rafter to foot of hip rafter. The diagonal is the length of the hip. That is, if the first common rafter is set to intersect the hip at the ridge. The same rule will give side cuts for jack rafters. Their lengths are easily obtained by extending their seats to the dotted lines, which are the hips in the diagram in question.



Framing Hip Roofs, as Explained by T. D. G.



Template No. 1, Referred to by L. M. Alger.

Note.—Our correspondent says in a postscript to his letter that he will cheerfully explain any points with regard to his diagram and rule that may be demanded by our readers. We are disposed to believe that some of our readers will be disposed to ask questions. We think, further, if our correspondent uses his rule a short time in practical work he will see various modifications that will render it more acceptable. The principle of obtaining the length of rafters is easily stated and easily applied. Like almost any other mathematical problem, however, there are various sides from which it may be approached, and different points of view from which it may be discussed. Nearly all that might be said with reference to the controversy regarding hip roofs resolves itself into a question of definition of terms, or the willingness to go through the entire series of steps, in preference to short cuts or abbreviated methods. We always like to hear our readers discuss these problems, and therefore, without further remark, we shall submit this for their attention.

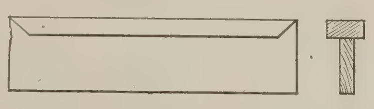
Describing an Oval.

From Y. S.—If not asking too much, will you kindly inform me, in an early issue of *Carpentry and Building*, which is the best method of describing a true oval, by intersecting lines or the use of a trammel? An answer to this question might be of interest to others besides myself.

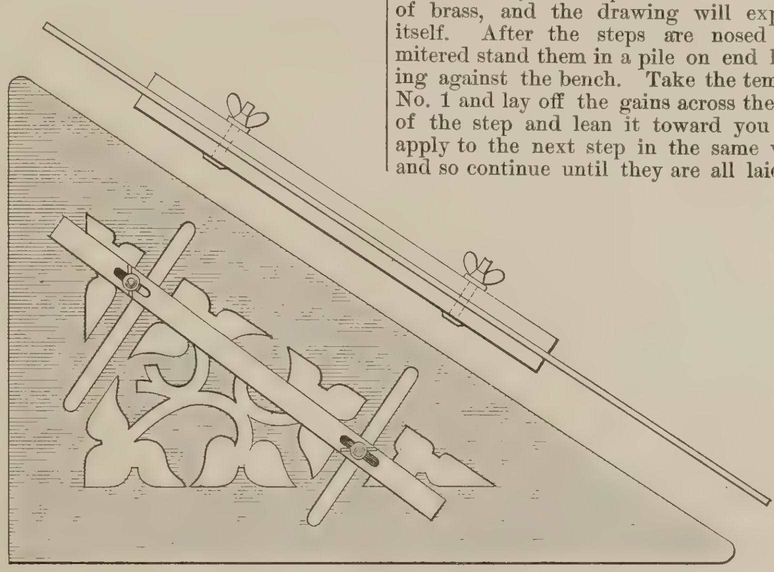
Answer.—We suppose by "oval" our correspondent means the geometrical figure correctly designated by the term "ellipse." Oval means egg-shape—that is, with one end larger than the other. True ellipses of varying proportions may be described either by the method of intersecting lines or by the use of the trammels. A string and pencil is another plan that may be mentioned. Each of these methods has its own advantages and each its own peculiar disadvantages. For practical work, such as carpenters and builders are called upon to perform, we are under the impression that the trammels are the best to use. In drawing and in such work as draftsmen perform we think that a string and pencil might possibly compete with the trammel, although the latter instrument is the favorite of many draftsmen. Drawing the figure by intersection of lines is a more tedious process than either of the others. All these methods have been described and illustrated in back volumes of *Carpentry and Building.*

Pitch Board.

From L. M. Alger, *Mansfield, Ohio.*—I send you a plan of a pitch board for stairs, also of two templets that I have been in the habit of using for some three years past. I have never seen or heard of anything like them, and presume they will be of interest to the readers of *Carpentry and Building.* The pitch board is made of brass, and the drawing will explain itself. After the steps are nosed and mitered stand them in a pile on end leaning against the bench. Take the templet No. 1 and lay off the gains across the end of the step and lean it toward you and apply to the next step in the same way, and so continue until they are all laid off and leaning against you. Then take templet No. 2 and apply to the end of step and mark depth of gain on top and bottom, then let it drop back against the bench, and so continue until all are laid off. By pursuing this plan the stair-builder does not lift or handle his work until it is all laid off. This, by long experience, I have found to be the best way. Miter the



Template No. 2, Described by L. M. Alger.



L. M. Alger's Pitch Board.

ends of one side of templet No. 2; then the other side will answer for a tri-square in laying off gains.

Hand-Railing.

From R. B. G., *Cadiz, Ohio.*—In answer to "C," of Cookport, Pa., whose question was published in the October number of *Carpentry and Building*, I would say—make the cylinder 10 or 12 inches in diameter, if the space will admit. Balusters are usually 2 feet 4 inches and 2 feet 8 inches in length; the latter being used on

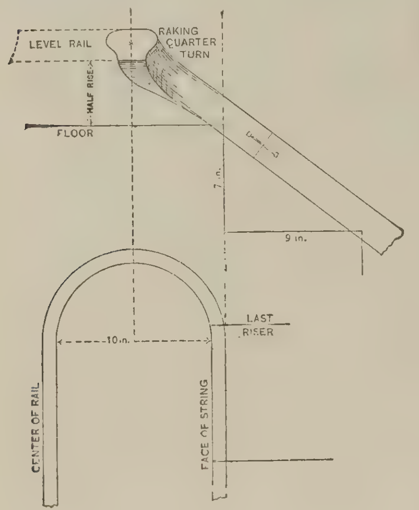


Diagram Accompanying Letter from R. B. G.

square steps and on the floor. The right place for the face of the last riser is half a run from the center of the rail at back of cylinder. Working the rail from the center of the block will raise the rail half a riser on the floor. The sketch which I submit illustrates what I have described.

From E. F., *St. Paul, Minn.*—I would like to ask "J. A.," of Utica., N. Y., in reference to his problem in hand-railing, how he obtains the point K. He says make the line F L cross the spring line at K. Will he please explain this point? In other respects his demonstration appears quite lucid.

From H. B. O., *Oskaloosa, Iowa.*—Inasmuch as there has been no reply to my problem in hand-railing, published in the April number of *Carpentry and Building*, I am forced to the conclusion that the subject has been exhausted, or that the readers of the paper have lost interest in the matter.

Strains in a Roof Truss.

From J. N. H., *Meridian, Miss.*—Referring to roof truss illustrated in your January edition, and the inquiry of your Holyoke correspondent, J. D., as to whether the truss rods were sufficiently strong, I beg to submit the following calculations of strains:

Estimating weight on each truss, including its own weight, at 50 pounds per square foot of roof surface, which is not too much for a roof which is subjected to heavy snows, &c., we get a uniformly distributed load on each truss of 53,000 pounds. The truss timbers alone should carry a uniformly distributed load of 6000 pounds in addition to their own weight, which leaves 47,000 pounds to be borne by the truss rods. One-third of this amount, or 15,666 pounds, is approximately the downward vertical thrust at each point B *b* and C *c*. Then by either of the following formulas we get the strain on truss rods:

$$\sqrt{\frac{AB_2 + Bb_2}{Bb}} \times \text{vertical thrust,}$$

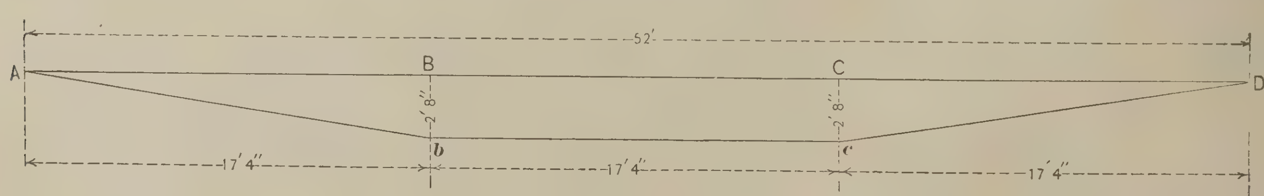
or using t to represent vertical thrust and x angle formed by BA*b*, then

$$\frac{t}{\sin. x} = \text{strain on truss rods.}$$

By either formula the result is 103,000 pounds, and to find diameter of an iron rod to bear safely a given pull:

$$\text{Diam.} = \sqrt{\frac{\text{Given pull} \times \text{coef. of safety}}{\text{Ult. ten. strength of material} \times .7854}}$$

Using 3 as a factor of safety, which is the very lowest that ought, under any circumstances, to be used, and 50,000 as the tensile strength of iron (and which I have no doubt is too great for the quality of iron used in the trusses referred to), we get a rod $2\frac{3}{4}$ inches in diameter, or as would be preferable, two rods, $1\frac{7}{8}$ inches diameter, instead of one rod $1\frac{1}{2}$ inches in diameter, as used. There are other faulty points in construction of the roof, notably the manner of joining rafters and truss, but, as "J. D." only invited criticism on the point just discussed, I will refrain from further comment.



Roof Truss.—Diagram Accompanying Letter from J. N. H.

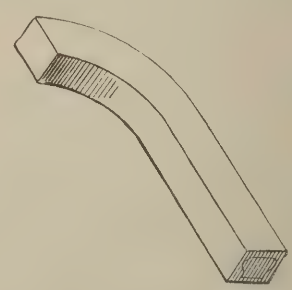
Reading Plans.

From C. R., *Boston, Mass.*—Please inform me through the columns of *Carpentry and Building* the best method to learn to read plans.

Answer.—We do not know of any better method than to give attention to practical draftsmanship, and, in the absence of a teacher, employing for the purpose any one of the many excellent manuals which exist. Reading plans is a very simple operation, indeed, as soon as one becomes at all familiar with the means of expression which draftsmen employ for different purposes. Familiarity with scales and the means of indicating different materials are, of course, essential.

The Function of Trade Journals.

From J. F. W., *Cincinnati, Ohio.*—The close perusal of trade journals is both beneficial and remunerative. The fact of a trade journal conferring benefits upon its subscribers should encourage them to try in turn to benefit others. This can be done by exchanging ideas on subjects which the readers ponder over daily. Knowledge has no value when stored away; to distribute it benefits, and, at the same time secures respect for the one who so acts. The laying bare of one's shortcomings is far preferable to having them exposed by others. The more we deal in facts, so much closer do we get to that point where general business should have its foundation—namely, stability. The readers—I mean the actual readers—of trade journals are comparatively scarce. This is a matter of regret; every tradesman and every mechanic has the time to read his trade journal. The fact of being busy is no excuse; offering such an excuse and acting upon it means a great loss of opportunity. The reader cannot expect that the Editor of a paper will dish up to him, week by week, what he is ready to devour for the small amount that he is paying as a subscriber. There must be some other compensation. Without stopping to determine this point, it is only fair that the reader, in turn, should make the journal a vent hole. He should contribute to it in proportion to what he receives, so that he may assist not only in maintaining the journal, but in making it useful in his own business. No matter what trade journal an interested person may go through, if he does it systematically, he will learn something by the operation that he did not know before. This something he will soon find the opportunity to turn to account; then he will feel that the paper has been a substantial benefit to him. If he encounters an article which appears to him ridiculous in its assertions and conclusions, that should prompt him to state his objections to the Editor. If he does this he will find, in many cases, that what he ridiculed was by him misunderstood. Having his attention called to this fact will, in turn, have done him good, in the sense of having broadened his ideas. Time and experience



Pattern Described by R. B. G.

will take the conceit out of most people. The fastest method of being rid of this undesirable package should be adopted. Those who furnish us good reading matter are our best friends.

Cutting Pitch Rafters.

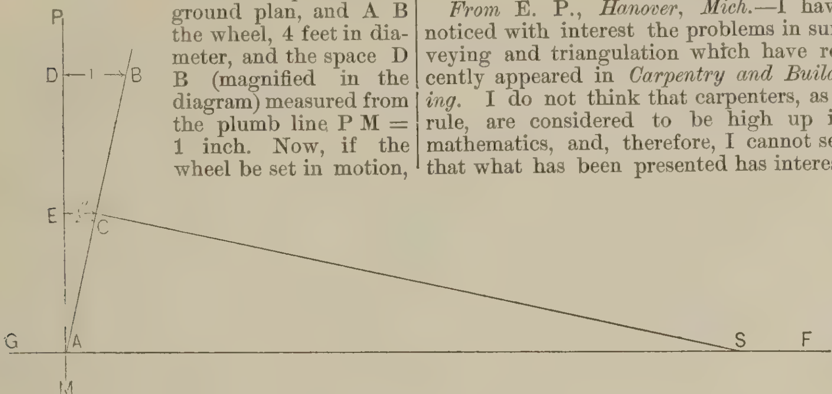
From J. H. W., *Greenfield, Mass.*—Your correspondent "S. J. P." wants to know what we think of his way of cutting pitch rafters. For my part I think that it is worse than nothing. If anybody wants to jump at this question, let him take three-fifths of the width of his building, and add $\frac{1}{60}$ inch for every foot so obtained. For example: Suppose a building is 30 feet wide; three-fifths of 30 would be 18 feet; $\frac{18}{60}$ inch equal three-tenths, making the length of the rafter required 18 feet, $\frac{3}{10}$ inch. This is correct within $\frac{1}{50}$ inch, and certainly is much easier than the methods suggested by "S. J. B."

From E. B. G., *Farwell, Mich.*—In the June number of *Carpentry and Building* "S. J. B." gives a rule for cutting rafters, and wants to know what the readers think of it. While the rule may suit your correspondent, I think it will hardly suit his brother chips, who look for whys and wherefores. I would like to ask one or two questions. Why does he multiply by $2\frac{1}{2}$, and why does he call the result inches? If he would give the reason for his rule I would be much better pleased with it. I use a rule, which is simple and

easy to comprehend, and will, perhaps, interest the readers of the paper who are following this subject. It is as follows: For one-third pitch, multiply one-half the span in feet by $14\frac{7}{16}$; in other words, the length of the rafter 1-foot run. The result will be the length of the rafter. For one-fourth pitch multiply in the same manner by $13\frac{3}{8}$, and for one-half pitch multiply by $16\frac{15}{16}$.

Solutions of Wheel Problem.

From E. C. S., *Findlay, Ohio.*—I offer the following as a solution to "W. C. T.'s" Wheel Problem, as given in the January number of *Carpentry and Building*, page 10. In the accompanying diagram, let G F represent the ground plan, and A B the wheel, 4 feet in diameter, and the space D B (magnified in the diagram) measured from the plumb line P M = 1 inch. Now, if the wheel be set in motion,



The Wheel Problem.—Solution Offered by E. C. S.

and the angle B A F that it makes with the ground plane G F remain constant, it will roll around the circumference of a large circle, of which the center is S, and is the point in which the wheel axis, produced, will intersect the ground plane G F, and the radius A S of this circle may readily be found as follows:

The angle D A B = angle A S C.

The angle A E C = angle A C S, both being right angles. Hence the triangles A C E and S A C are similar and proportional.

Then C E : A C :: A C : A S, from which we find that

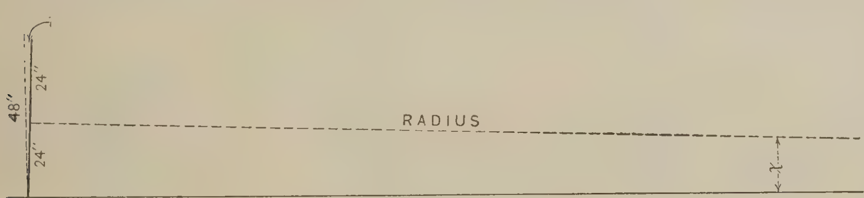
$$A\,S = \frac{A\,C^2}{C\,E} = \frac{576}{\frac{1}{2}} = 1152.$$

The circumference of a circle, of which A S is the radius, is as many times greater than one of which A C is the radius, as A S is greater than A C.

Hence the number of revolutions the wheel A B will make in going once around the circle of which A S is radius

$$= \frac{1152}{24} = 48, \text{ answer.}$$

From J. N. H., *Cincinnati, Ohio.*—In answer to "W. C. T.'s" "Wheel Problem" in your January number, I submit the following solution: It being evident in Fig. 2, that the angles x, and that formed by the slanting wheel and its perpendicular are equal, then the chords 1" and 24" are consequently proportional to their respective radii; therefore—1 : 48 : : 24 : 1152 inches, or 96 feet = radius of circle described by the wheel in its travel. Multiply twice this sum, or the diameter, by 3.141593 we get 603.2 feet as the circumference of said circle. The circumference of the wheel being 12.5664 feet, then 603.2 ÷ 12.5664 = 48, or the number of revolutions made by the wheel in describing the circle.



Solution Suggested by J. N. H.

Colored Wash for Buildings.

From C. A. G., *Leonardtown, Md.*—Can any reader of *Carpentry and Building* recommend a substitute for whitewash for the outside of buildings having rough siding? I wish to give my house some other color than white. A wash made of good cement, to which coloring matter has been added, has been recommended. Can any one give me the result of their experience with such a wash?

The Surveying Problem.

From E. P., *Hanover, Mich.*—I have noticed with interest the problems in surveying and triangulation which have recently appeared in *Carpentry and Building*. I do not think that carpenters, as a rule, are considered to be high up in mathematics, and, therefore, I cannot see that what has been presented has interest for a very large class among your readers. I would suggest to any one in the trade who encounters a problem of this kind in practical work, that the best way, at least so far as saving time is concerned, is to guess at half the distance and multiply by two. I think the result obtained by this method would be fully as accurate as that reached by most carpenters if they followed the elaborate rules which your correspondents have presented.

Outside Sheeting.

From G. B., *Rutherford, N. J.*—In the October number for last year, "H. G.," of Medina, Ohio, passed his opinion with regard to outside sheeting on buildings. It seems to me he is a good way off. If he has the sheeting, which is most generally $\frac{7}{8}$ or 1 inch stuff on the inside, and has only 6-inch bevel siding, the kind commonly used in this neighborhood, on the outside, he will find that he does not arrange his studding so as to bring them to equal width, that the outside lines will be in and out, and, accordingly, will make a laughing stock of his work. I would direct attention to another point, also. In this neighborhood we usually cut our joints so as not to admit any water, at least not enough to rot any part of the sheeting, for we cover it with tar-paper. If the painter uses the material generally called for by the architect, and does not spare it, I am sure "H. G." will never have much rotten sheeting to tear off. Good joints, dry lumber, good paint, together with good workmanship upon the part of the painters and roofers, do wonders toward keeping out the water. Further, your correspondent says that his sheeting is put on the inside and it will not get wet. I will admit that; but how about the studding and corner posts, will they remain dry if the weather boards get wet?

From S. F. B., *Wellington, Ohio.*—I think Mr. Goodwin's statement about outside sheeting rotting in 10 years is no credit to him. As a builder with 20 years' experience in the business, I am prepared to say that I never saw nor yet heard of such a case.

Origin of Planes.

From C. K. T., *Madison, Ohio.*—I would like to ask the readers of *Carpentry and Building* for information on one or two points in history. Can any one tell me when the well-known wood plane first came into use, and what device the ancients had for smoothing lumber? If any one has given this subject attention in his researches, it would be interesting to learn what he has discovered.

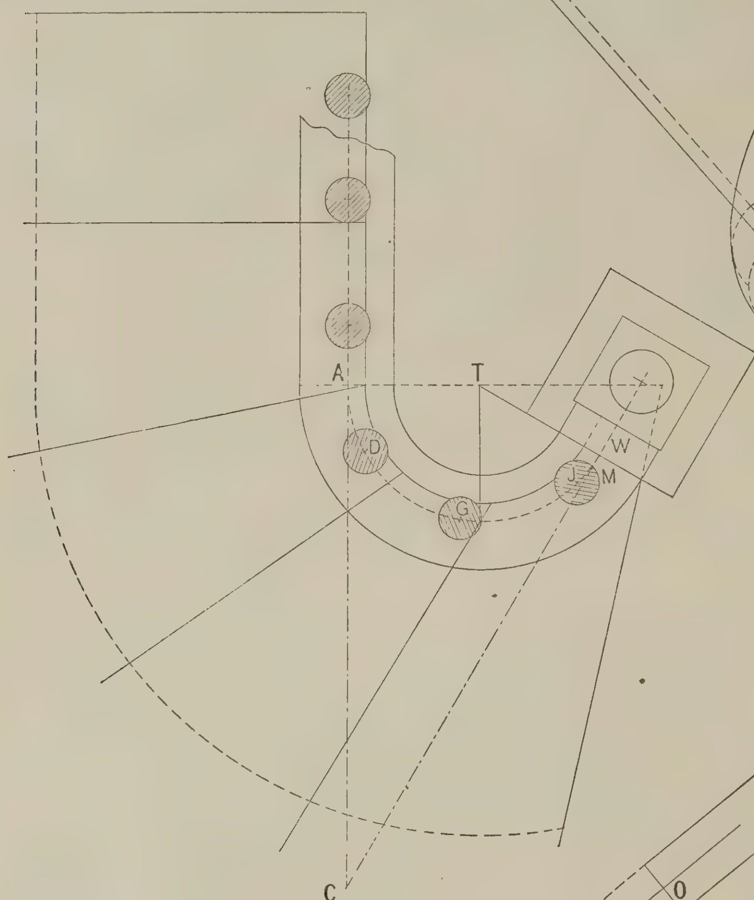
Stair-Building Problem.

The well-known writer on stair-building topics, James H. Monckton, of this city, has recently prepared, and John Wiley & Sons of 15 Astor place, New York, have just issued, a new volume on stair-building. In this what the author terms the new one-plane method of hand-railing is shown as applied to drawing face molds, unfolding the center lines of wreaths and getting the lengths of balusters under all wreathes. We have thought that it would be to the interest of many of our readers to present a few selections from the volume in question. The cuts on page 34 represent the engravings in Plate 48 of the book. The author, in his preface, says: "The experienced stair-builder will learn that this one-plane method of drawing all face molds and also the manner of finding the angles with which to square wreath-pieces is simple, uniform and rapid. No matter how skillful a stair-builder he may be, he will find that in the extent and completeness of detail with which the subject is treated it will prove a valuable work of reference. The expert rail worker will learn of the geometrical law controlling the top and bottom curves of every wreath-piece, showing that a face mold is not only a means of shaping the sides of a wreath piece on the plane of the plank, but that it carries with it a central geometrical curve that must be observed in shaping the top and bottom surfaces of the wreath. To prove this in a practical way it is only necessary to call attention to the fact that in the case of round hand rail over any curved plane, its sides hang vertically over the plane, while its top and bottom form proper curves, giving its own easings perfectly suited to the requirements in all cases. When it is considered that a molded rail over the same plan would be subject to the same center and tangents with the same joints, then the absolute control of the curves forming the top and the bottom of a wreath by this central geometrical curve line becomes self-evident." At this point the author refers to Plate 48 as giving an example, among many others, of the correctness and practical value of unfolding the center line of a wreath. As already stated, the engravings presented herewith are from the plate in question.

Fig. 1 shows the plan of the bottom part of a flight of winding stairs, turning one-quarter, and starting with a newel. The author, in his directions, says: "Draw the center line of rail, and space the balusters as required. Then to find the length of the plane tangent A A and other measurements, proceed to set up the elevation."

Fig. 2 shows the elevation of the treads and risers as given in the plan; also the center line of the wreath-piece. The author says: "Place the center of baluster

on each step, as in the plan, and draw lines through these centers parallel to the riser lines indefinitely. Let the bottom line of rail pass through X X, the centers of short balusters on the regular treads. Draw the center line O C parallel to X X indefinitely. Make B O equal to 2½ inches or more at pleasure for straight wood at the upper end of the wreath-piece. Make M V 6 inches and V N half the thickness



Stair Building Problems—Fig. 1.—Plan of Bottom Part of a Flight of Winding Stairs.

of the rail. Through N, at right angles to the chord line, draw A C. Then A C will be the length of the plane tangent A C in

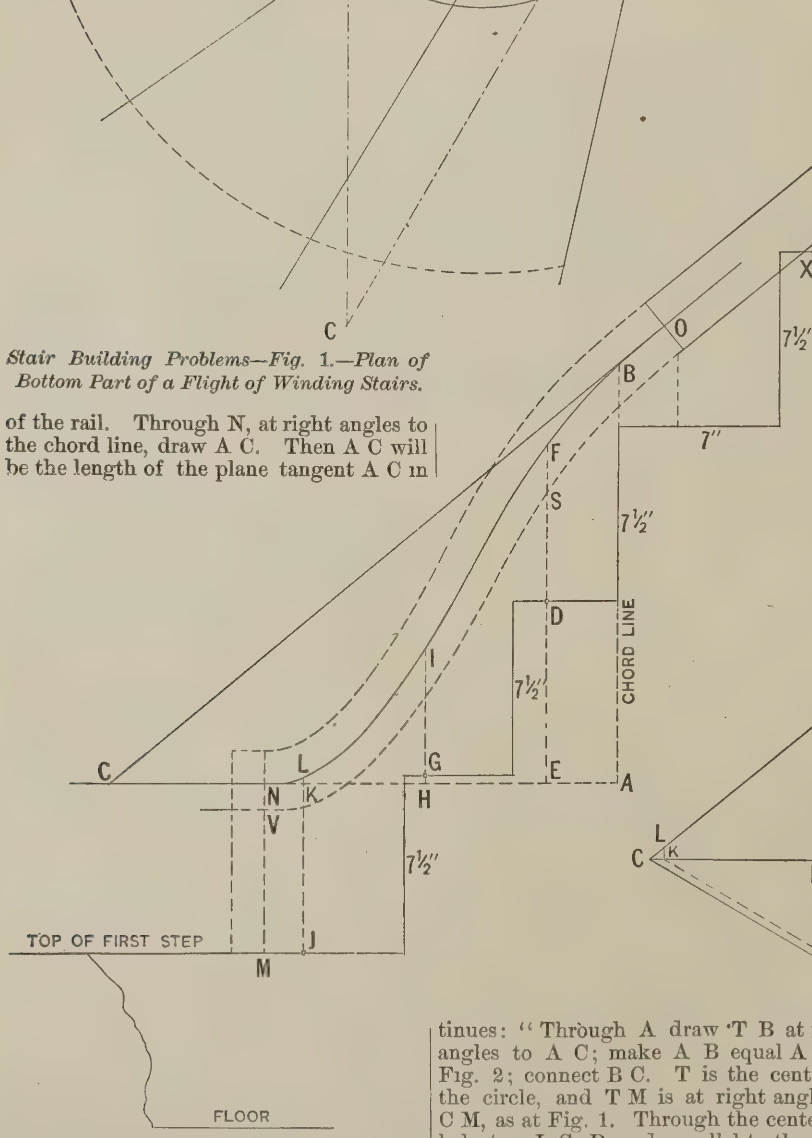


Fig. 2.—Elevation of Treads and Risers, as Given in Plan.

Fig. 1. If from C of Fig. 1 a line is drawn touching the center line of rail at M, it will be the level tangent."

Fig. 3 shows the plan of the center line of rail and tangents, A C and CM, from Fig. 1. Also the centers of balusters D G J in place, as in Fig. 1. The author continues: "Through A draw T B at right angles to A C; make A B equal A B of Fig. 2; connect B C. T is the center of the circle, and T M is at right angles to C M, as at Fig. 1. Through the centers of balusters J, G, D, and parallel to the level tangent M C, draw J K, V H and S E; parallel to A B draw E F, H I and K L; from A draw A P at right angles to the level tangent C M; on C as center with C B as radius describe the arc B P; connect P M. To find the angle with which to square the wreath-piece at the joint over A: From E parallel to C B draw E R indefinitely; prolong C A to Q; make A Q equal A R; connect Q S. Then the bevel at Q

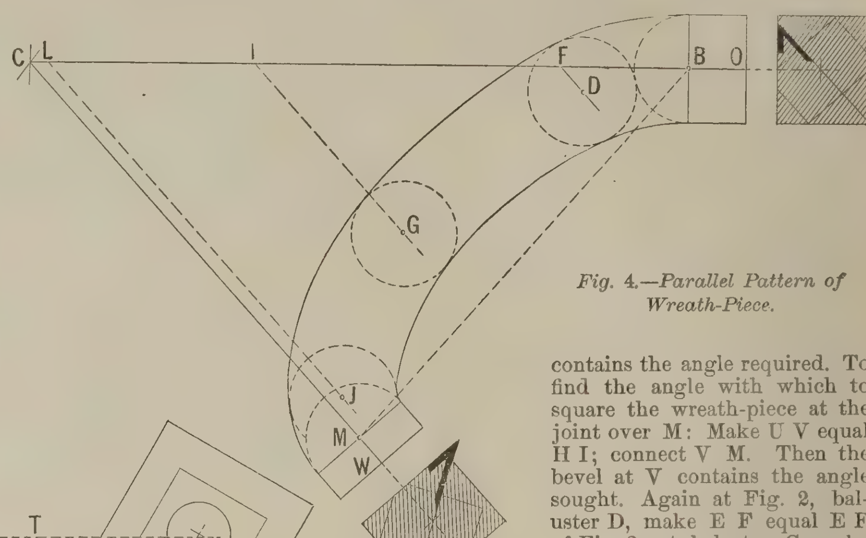


Fig. 4.—Parallel Pattern of Wreath-Piece.

contains the angle required. To find the angle with which to square the wreath-piece at the joint over M: Make U V equal H I; connect V M. Then the bevel at V contains the angle sought. Again at Fig. 2, baluster D, make E F equal E F of Fig. 3; at baluster G make H I equal H I of Fig. 3; at baluster J make K L equal K L of Fig. 3. Through the points B F I L N trace the center line of the wreath-piece; set off each side of the center half the thickness of rail as shown by the dotted lines. To find the lengths of balusters: Take for example baluster D, D S measuring 4½", which must be added to 2' .2"—the length of short baluster at X from the top of step to the bottom of the rail—making the length of the baluster D between the same points 2' .6½". The hight of rail at the newel is calculated by adding M V, 6" to the length of short baluster at X, 2' .2"; making the hight from M to V 2' .8"."

Fig. 4 shows parallel pattern for wreath-piece from the plan in Fig. 3; it also shows the squaring of the wreath piece at

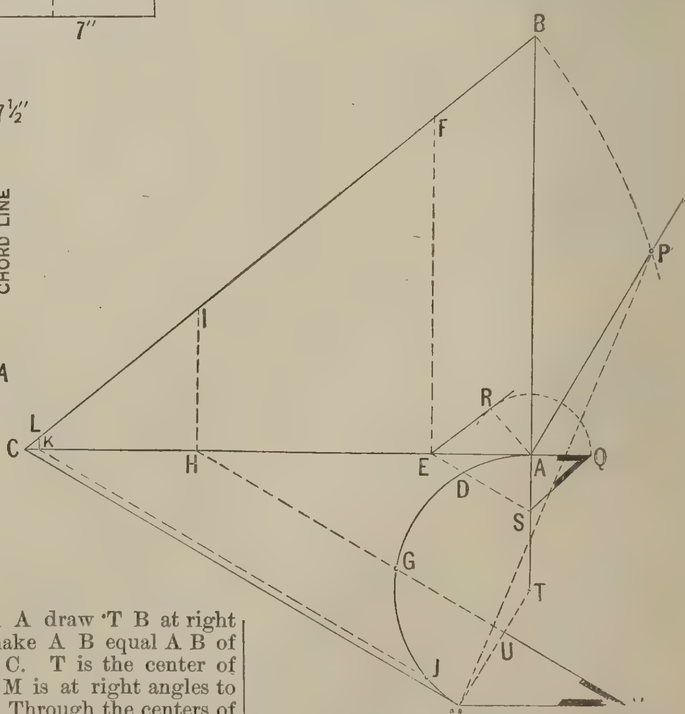


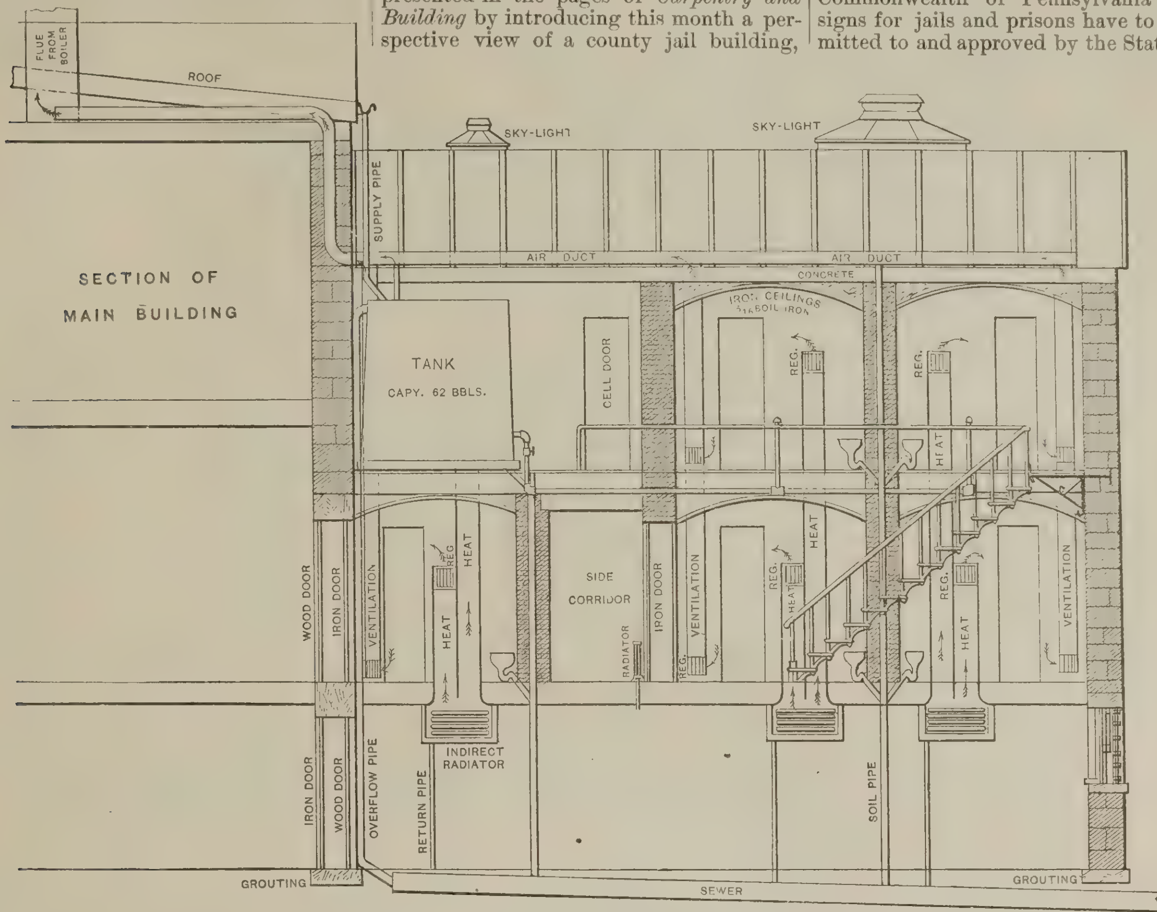
Fig. 3.—Plan of the Center Line of Rail.

the joint. The author says: "Make M B equal M P of Fig. 3. On B as center, with B C of Fig. 3 as radius, describe an arc at C; on M as center, with M C of Fig. 3 as radius, intersect the arc at C; connect

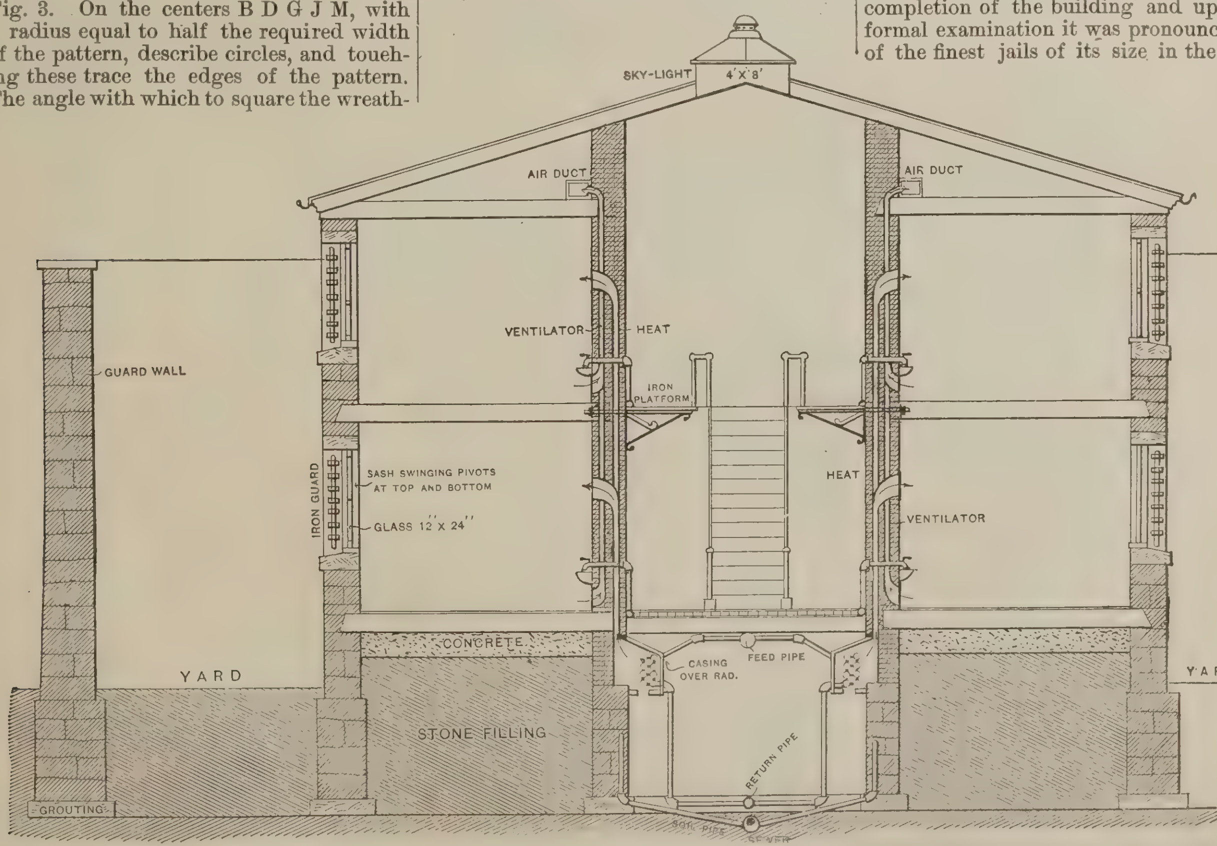
C M and C B; prolong C B to O; make B O equal B O of Fig. 2. Make M W equal M W of Fig. 1. Make the joints O and W at right angles to the tangents. Make B F I L equal the same at Fig. 3. Make F D, I G and L J equal E D, H G and K J of Fig. 3. On the centers B D G J M, with a radius equal to half the required width of the pattern, describe circles, and touching these trace the edges of the pattern. The angle with which to square the wreath-piece at joint O is taken by the bevel Q of Fig. 3, and the angle for squaring the wreath-piece at joint W is taken by the bevel at V of Fig. 3."

Jail Plans.

We vary the range of designs ordinarily presented in the pages of *Carpentry and Building* by introducing this month a perspective view of a county jail building, floor plans of the same, and also transverse and longitudinal sections through the jail proper. The plans in question were prepared by J. F. Stettler, Middleburgh, Pa., and represent the Snyder County prison erected at that place, some time since. The drawings show so clearly the features of construction that extended description is unnecessary. It is sufficient to say that according to the laws of the Commonwealth of Pennsylvania all designs for jails and prisons have to be submitted to and approved by the State Board of Charities. The plans here shown, we are informed by the author, were duly approved by this commission, and after the completion of the building and upon the formal examination it was pronounced one of the finest jails of its size in the State. Special reference was made to the security afforded by the building and also to its sanitary features. The main building, or sheriff's residence, is built of white sand-

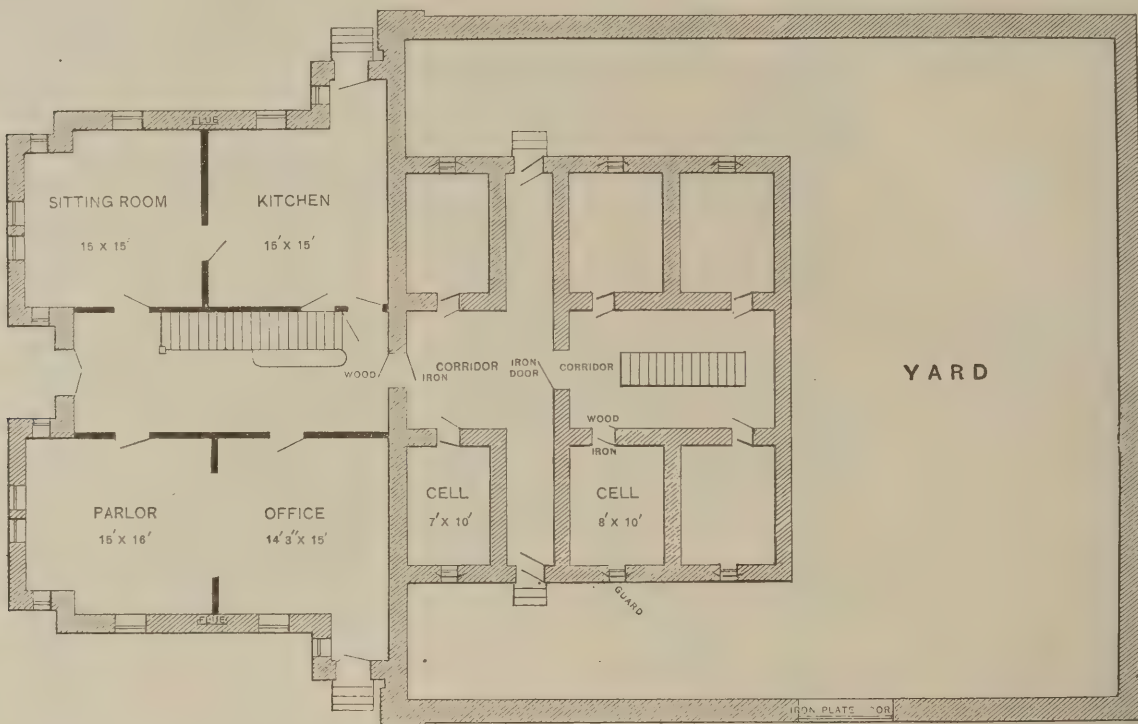


Snyder County (Pa.) Prison.—Longitudinal Section Through Cells.

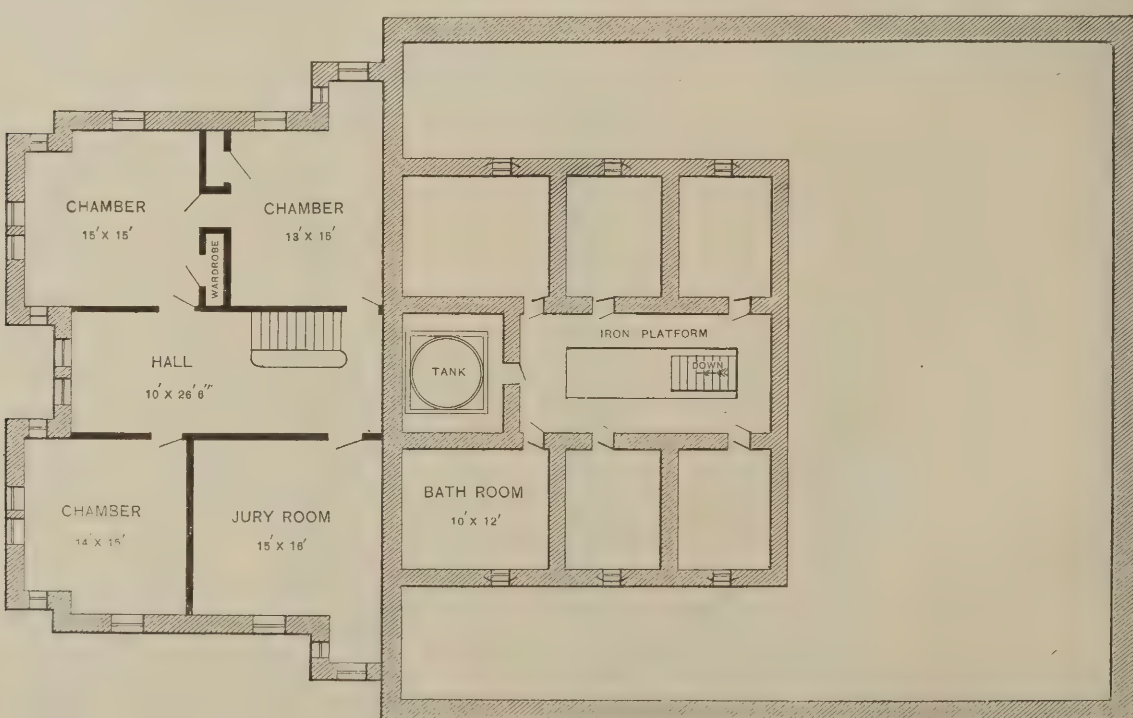


Cross Section Through Cells and Corridor.

stone, with trimmings of brown sandstone. The base is of red sandstone. The panel course below the battlements are white and the trimmings brown. This combination of colors gives the building an attractive appearance. The walls are laid in rock face masonry, ashlar courses. The roofs are of galvanized iron. Black mortar was used in pointing the walls. The outside walls of the jail were built of rough stone and the inside walls or partitions of brick. The buildings throughout are heated by steam. A boiler for this purpose is located in the basement of the main building. The cost of the jail, we are informed, was $22,000. The perspective view shown in the plate affords the reader an excellent idea of the general appearance of the structure. The floor plans and sections explain themselves.



Snyder County (Pa.) Prison.—First Floor Plan.—Scale, 1-16 Inch to the Foot.

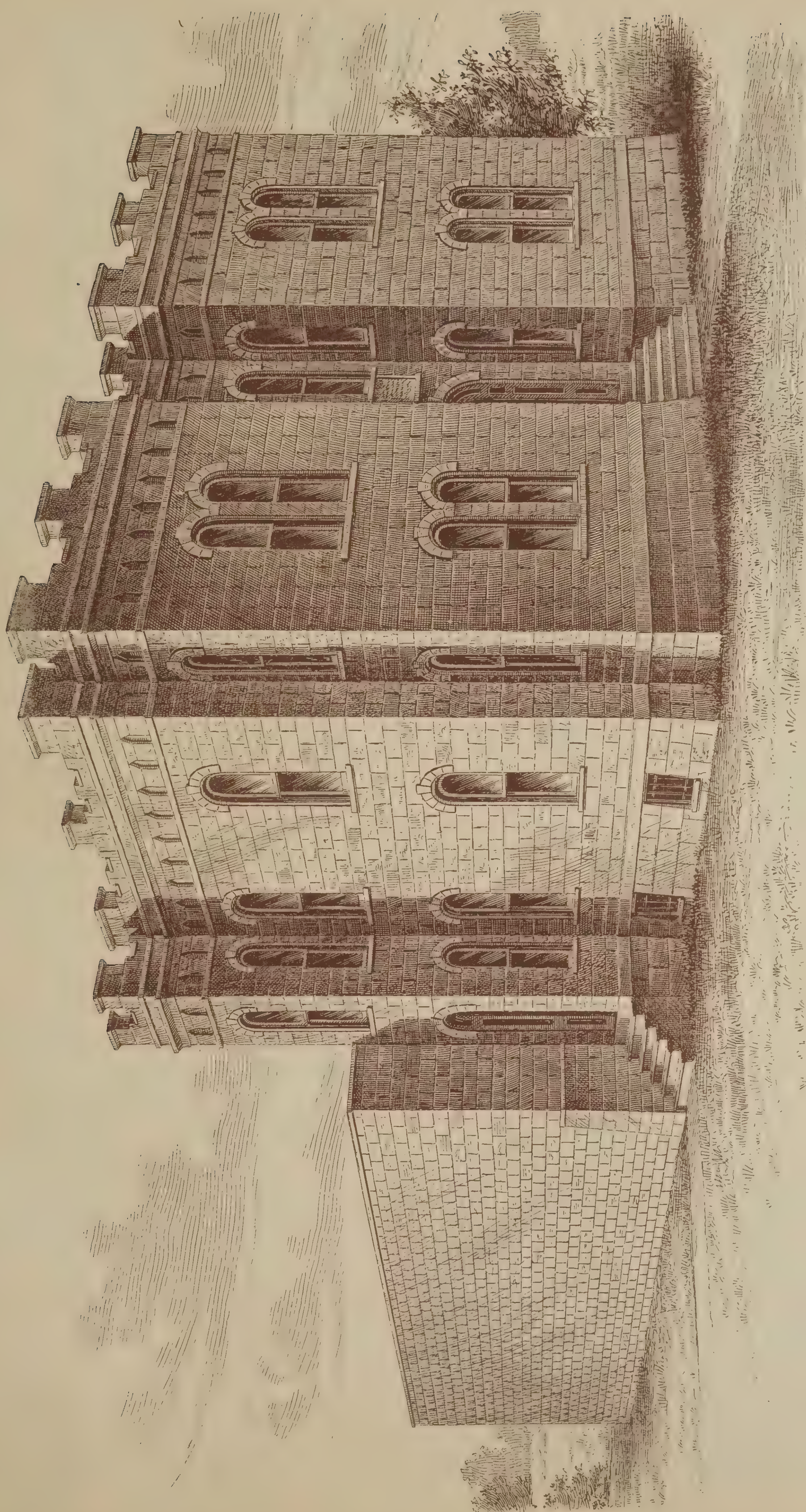


Second Floor Plan.—Scale, 1-16 Inch to the Foot.

Wood Mosaic.

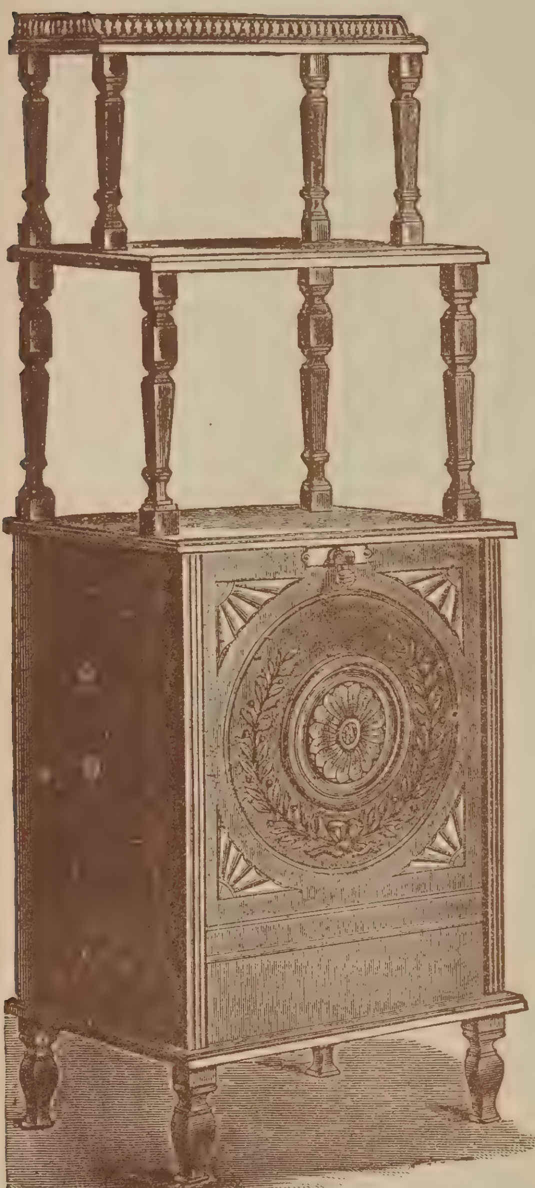
One of our exchanges presents the following particulars with reference to wood mosaic:

The demand for wood floors, which have been growing in public favor within the last few years, has so increased that it is carefully studied when people contemplate building or when making changes in their house. The end-wood mosaic consists of small blocks of various woods set on end and joined by leaden tongues; each block has a square upper and lower surface and shallow groove surrounding. The block is formed separately from a thoroughly kiln-dried "block" by a special automatic machine, which joints the block and makes the groove in all four edges at one operation. Instantly, before they become cold, the blocks are assembled in a special device called a chase, and closely pressed together, while molten lead is forced into the grooves. The assemblage thus becomes a solid section. The lead is all in one piece, surrounding each block and holding each in place, but is not seen on the surface. The sections are 16 inches square. The vertical thickness of the blocks is invariably $\frac{7}{8}$ inch, and they are planed and smoothed on the upper surface, jointed and grooved on the edges and dipped in linseed oil. The woods most used are ash, oak, cherry, maple, walnut and mahogany, though other woods are employed when demanded. Ash is singularly beautiful by reason of its great variegation. The strong contrast produced in pattern work taken from the outer part of the log, combined with the grain in other parts, gives a



Snyder County Prison, Middleburgh, Pa. Designed by J. F. Stetler.

Floor Design, by R. Fischinger.



The "Scarborough" Coal Box

The "Rob Roy" Coal Box.

The "Malvern" Coal Box.

HARDWOOD MANTEL.

DESIGNED AND BUILT BY

HEGAN BROTHERS,

LOUISVILLE, KY.

The "Waverly" Coal Vase.

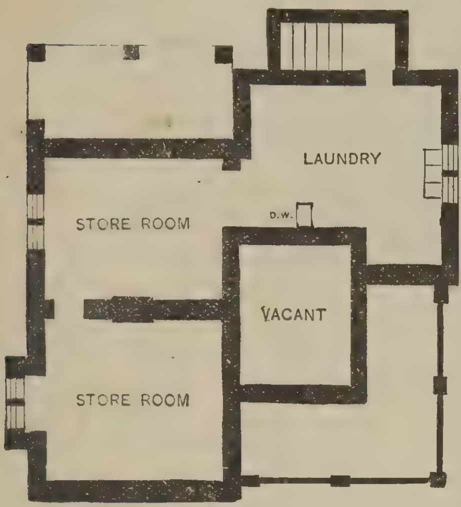
The "Wigen" Coal Vase.

FRONT ELEVATION. Scale, 1-8 Inch to the Foot.

SIDE ELEVATION. Scale, 1-8 Inch to the Foot.

HOUSE STUDY. BY W. G. MUMMA, WARRENSBURG, MO.

rich effect. Oak is remarkable by reason of the distinctness of its medullary rays. Cherry produces a warm, rich effect, which increases with age, and is much darker than when laid plankwise of the grain. Walnut

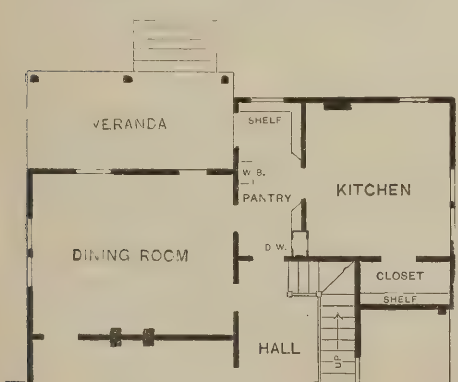


House Study.—Basement or Cellar Plan.—Scale, 1-16 *Inch to the Foot.*

and mahogany are used for strong contrasts in pattern work or to cover larger surfaces where special effects are desired. Of the extreme durability of end-wood mosaic, when compared with common parquetry, there can be no question. Its beauty we cannot describe: this quality is so novel and so striking that its admirers seem to be as numerous as those who have never seen it. Its noiselessness and elasticity are no less conspicuous: the leaden tongues, the nail blocks and the method of laying contribute to these results. Its perfection of surface is persistent in spite of hard usage. The facility with which it is kept in perfect condition is remarked by all who have used it. Its economy in comparison with side-wood flooring or with carpets is indisputable when these facts are given their proper weight.

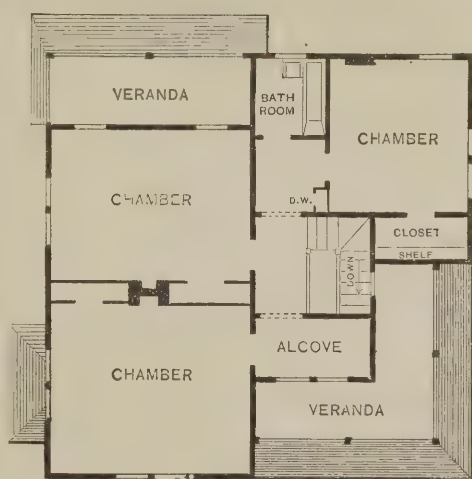
Study in House Plans.

In Plate VIII, and on this and the pages following, we show elevations, plans and details of a house designed by W. G.



First Floor Plan.—Scale, 1-16 *Inch to the Foot.*

Mumma, Warrensburg, Mo. According to the brief specifications which the author has supplied us, this building would cost in the neighborhood of $4000. It is adapted for a building on a corner lot. It should be placed 3 feet above grade line, on the supposition that the lot is level. The first story measures 10 feet and the second story 9 feet; the basement is 8 feet. By reference to the floor plans it will be seen that under the kitchen is located the laundry, and there is ample store room in the basement. The kitchen has a large closet, also a pantry, with access to different parts of the house. A dumb-waiter is provided, running through the kitchen and pantry from the laundry to the chamber floor. In order to cheapen the cost of the house, a back hall has been omitted. The staircase, however, is so located as to be accessible from all parts of the building. The rear veranda is connected with the dining-room and kitchen. The parlor, which if desired might also be used as a sitting-room, is provided with a bay-window on the side. The front veranda is provided with a balustrate so placed as to leave 5 feet width in the clear. Ascending to the second story it will be noticed that each of the chambers is provided with ample accommodations. Open fireplaces are provided in all the rooms except in kitchen and the bedroom above. The alcove over the front hall provides a very pleasant place for sitting when the weather will permit



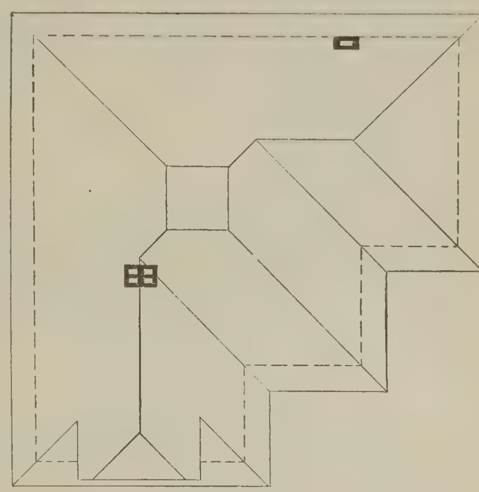
Second Floor Plan.—Scale, 1-16 *Inch to the Foot.*

the use of such a place. The roof extends over the rear veranda, which is so proportioned as to be 6 feet in width. The bathroom is placed over the pantry so as to bring all the water pipes close together.

The difference between building in America and in some of the older parts of the world is illustrated by an item that is at present making the rounds of the English papers. Some 16 years since a town-hall was built at Rochdale, at a cost of $150,000. Recently the town council have discovered that the building at present requires thorough re-roofing and other expensive repairs. Such occurrences as this in America, at least in many portions of this country, would pass almost without notice, being accepted as the natural order of affairs, but on the other side of the water it seems things are different. One of the aldermen, on the occasion named, took the opportunity to denounce the contractors of the building, stating that they had scamped the work in every possible way, and measures by which they might be punished were seriously considered. The item in question concludes that it is monstrous that a town-hall which was erected at so great an expense should require repairs after only 16 years.

Fire-Proofing Process.

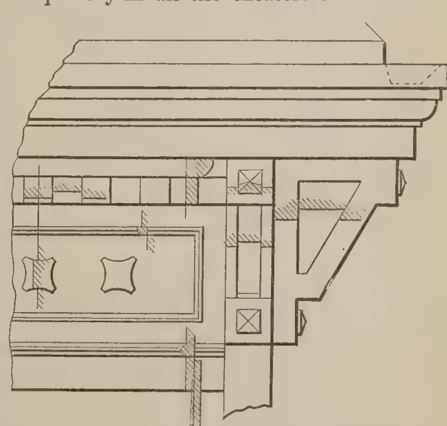
At a meeting of the Franklin Institute, held in September last, Prof. Arthur



Roof Plan.—Scale, 1-16 *Inch to the Foot.*

Beardsley presented a paper on the Martin process of fire-proofing woodwork. As the subject is of interest to all workers in wood, we present the following abstract of his remarks:

Many attempts have been made to discover a process for rendering tissues, wood, &c., uninflammable. The fearful losses of life and the great destruction of property by fire makes the question one of the greatest importance. The object sought has been the discovery of a means of so protecting combustible materials that they will ignite with difficulty, burn without flame, and cease burning when the source of heat is removed. The objection to former processes has been that the fire-proof quality has not been permanent, causing the necessity of frequent and costly renewal. The Martin process is cheap, easily applied, is not poisonous or corrosive, does not alter texture or color, and secures to fabrics a *durable* uninflammability. It has been subjected to the most severe tests by the eminent French chemists Dumas, Paliard and Troost, acting as a committee of the Society for the Advancement of National Industry, not only in the laboratory, but also in the theaters, the tests extending over several months and to a wide range of combustible materials, with the result that the process is now compulsory in all the theaters of France.

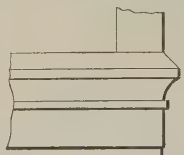


Detail of Main Cornice.—Scale, ½ *Inch to the Foot.*

Similar tests have been made in Turin by Professors Sobrero and Carlevaris, with the most satisfactory results.

In this country the process has been most

thoroughly investigated by Profs. R. Ogden Doremus and Henry A. Mott, who certify that it renders all combustible matter absolutely uninflammable; that it protects wood from decay and from the ravages of insects; that it is a most reliable and effectual fire extinguisher; that its effectiveness is permanent; that it is easily and generally applied, and is inexpensive; that it is neither poisonous nor corrosive, and affects neither textures nor colors. The materials are dipped into a solution of "glycero" and left there about 15 minutes, after which they are allowed to dry, or are ironed dry if desired.

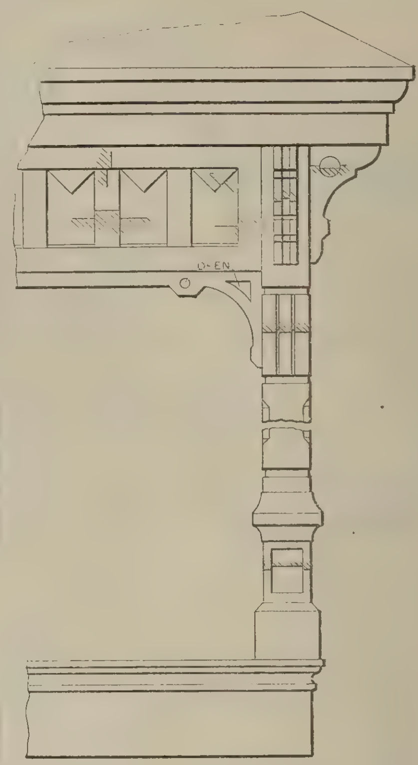


Water-Table.—Scale, ½ Inch to the Foot.

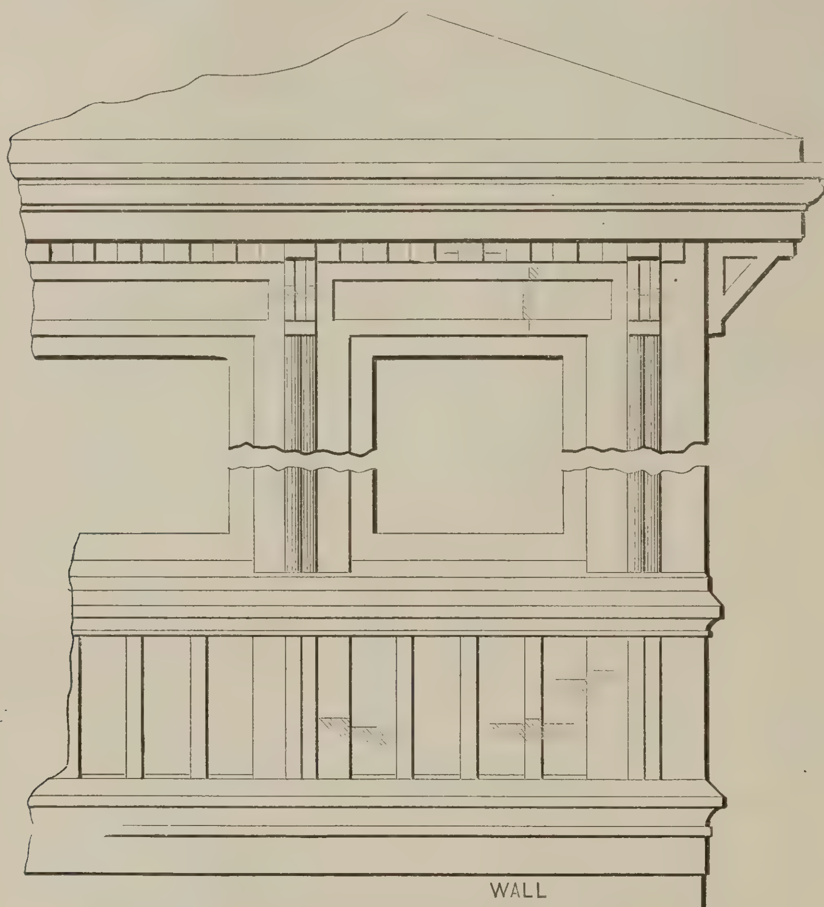
sior, &c., but the "treated" specimens, as you see, defy our efforts to make them burn, simply charring under the intense heat of the Bunsen burner. Its cost is less than ½ cent per yard for the lighter fabrics. The "glycero" composition does not differ materially from other fire-proof compositions except in the addition of a quantity of glycerine, to which its permanence is due. The composition is made up somewhat differently for different materials, one form of which, as contained in Dr. Mott's report, being as follows:

	Per cent.
Glycerine 28° B	9.71
Carbonate of ammonia	4.85
Chloride of ammonium	38.84
Cream of tartar	3.84
Oxalate of potash	3.84
Boracic acid	38.84
Total	100.00

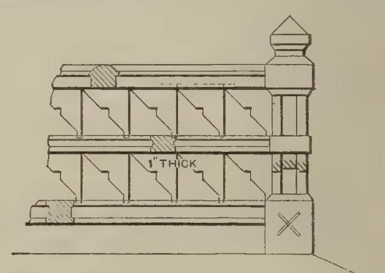
that the success of the preparation was due to the presence of glycerine, which tended to hold the salts in solution (so to speak), thus protecting them from being evaporated or vaporized at ordinary temperatures, as it is well known that glycerine does not evaporate. The pressure of glycerine in the salts used for fire-proof paint seems to prevent crystallization or disintegration of the salts, so that on the application of heat the paint film is more elastic, not cracking like ordinary paint films, thus exposing the untreated wood to the action of the flame, but causing the film to swell and hold together as the gas generated by the decomposition of the salts formed by the application of the flame. Dr. Mott stated that the value of the process consisted in being able to locate the flame or fire, so that it would be unable to spread the flame, simply charring the wood or fabrics at the point of application.



Front Veranda.—Scale, ½ Inch to the Foot.

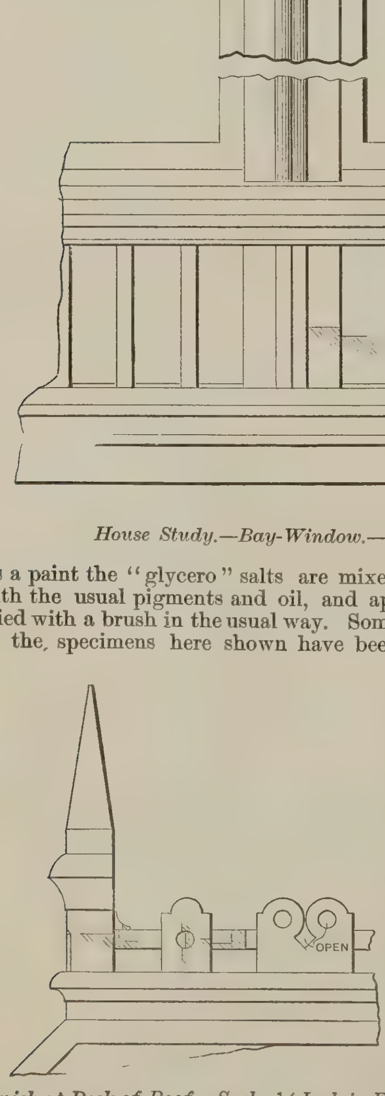


House Study.—Bay-Window.—Scale, ½ Inch to the Foot.



Balustrade to Veranda.—Scale, ½ Inch to the Foot.

As a paint the "glycero" salts are mixed with the usual pigments and oil, and applied with a brush in the usual way. Some of the specimens here shown have been treated for several months, one piece of wood having been "dipped" in 1885. Some of these materials are naturally of the most inflammable character, as light dress goods, newspapers, cotton wadding, excel-



Finish at Deck of Roof.—Scale, ½ Inch to Ft.

Professor H. A. Mott, of New York, when called upon, alluded to the character of the tests conducted by the committee to determine the duration of the process, which test consisted in exposing tissues, woods, fabrics of all kinds, which had been treated by the Martin process to a temperature of 115° F., in an oven for over seven months, during which time currents of dry and moist air were alternately passed through the chamber, the articles thus exposed being as perfect after the test as before. He then gave the composition of the Martin mixture, and stated

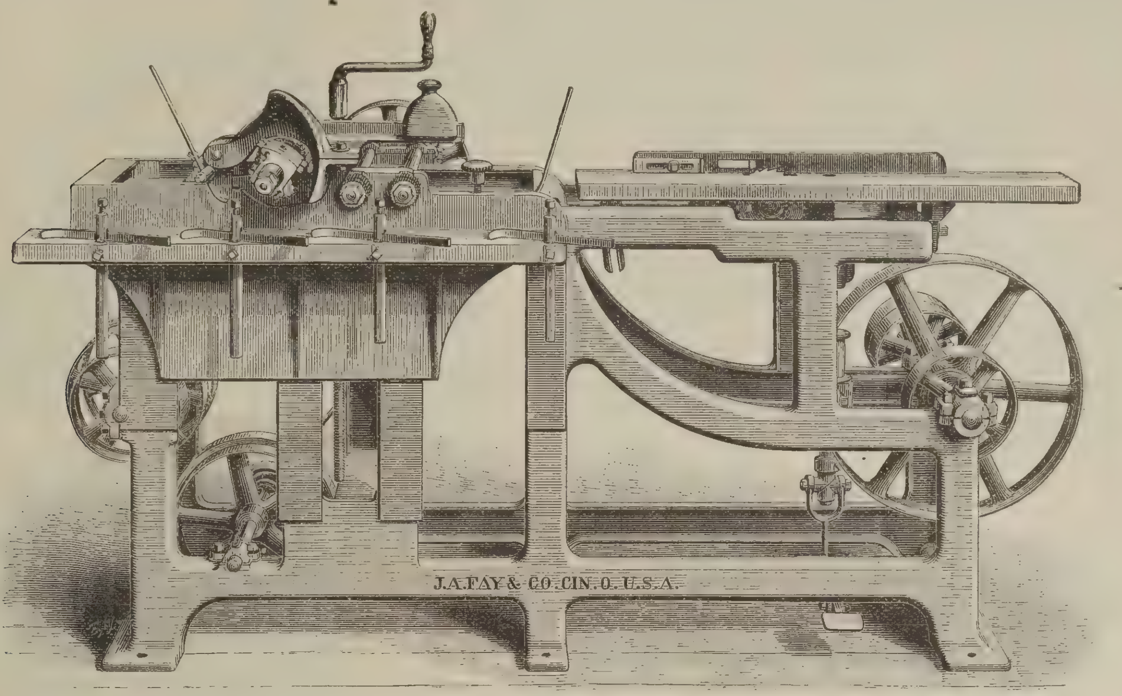
Finish of Front Windows.—Scale, ½ Inch to the Foot.

Dienbeldt & Eisenhardt, of Philadelphia, have just completed their new foundry, which is probably one of the most complete of its kind in the country. The arrangements for light, heat, ventilation, &c., have been studied out thoroughly, with a result that is highly satisfactory. Many of the appliances have been developed by the proprietors personally, that in the matter of ventilation being specially ingenious. There are 60 windows arranged so as to catch the air from any quarter, any ten of which can be opened or set at any angle by the slightest touch of the hand.

NOVELTIES.

Sash Sticking Machine.

An improved sash sticking machine with plowing and boring attachments, recently brought out by J. A. Fay & Co., of Cin-



Novelties.—Fig. 1.—New Sash-Sticking Machine, Built by J. A. Fay & Co., Cincinnati, Ohio.

cinnati, Ohio, is shown in Fig. 1 of the engravings. The makers describe the machine as a most efficient device for sticking sash stiles and plowing and boring for the sash cord at the same time. By the use of this device one operator does the work that heretofore has required two machines and two operators to accomplish successfully. The machine has a substantial frame, made long to give good length of belts to the cutting mandrels. The cutting spindles are of the best steel run in self-oiling bearings, babbitt lined. The plowing and boring attachment consists of a supplemental table with vertical boring spindle and horizontal grooving head and spindle placed at the feeding end of the machine. The table has a vertical adjustment, is fitted with adjustable stops for gauging the length of the groove and position of the

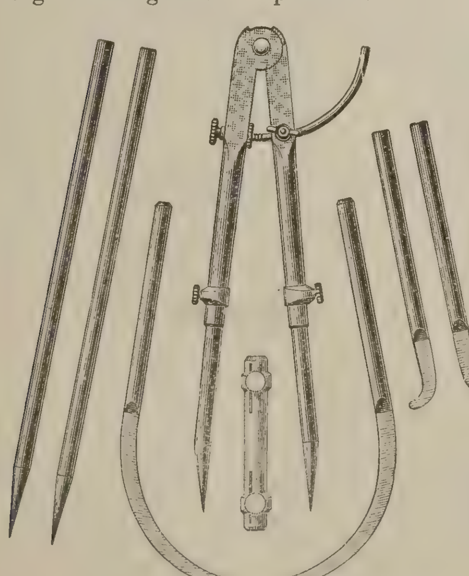


Fig. 2.—Starrett's Combination Dividers.

hole for the knot in the cord. The stile is first moved along the table over the grooving saw, cutting the groove to the proper length. The boring is accomplished by a foot treadle raising the boring bit into the stile to the proper depth. After this operation the stile is passed under the feed-roll and horizontal gutter-head and properly dressed. As the plowing and boring of one stile is done while another is passing through the sticking machine, the makers direct attention to the fact that there is really no expense whatever attending the plowing and boring. They state further that a boy can operate the machine. The feed-roll is large in diameter and strongly geared, producing a positive feed. The compound bonnet and pressure-bar used by this firm is placed on the machine, and is of such a character as to be swung entirely out of the way for ready access to the sticking head for the purpose of adjustment. The machine can be used for sticking door rails, blinds, &c., the only change necessary being suitable heads or cutters.

Combination Dividers.

L. S. Starrett, of Athol, Mass., is introducing a combination dividers for woodworkers. It is illustrated in Fig. 2 of the engravings. The cut shows the article complete, with the different attachments that are provided to go with it. The article may be used in the form of dividers, with either short or long extension points, and either with or without a pencil. It is also capable of being used as an outside calipers or inside calipers, and also in the form of hermaphrodite calipers. Articles of this kind have been before the public for a long time past, but this instrument, we are informed, possesses features peculiarly its own. The head and socket legs of the tool, we learn, are made from drawn bronze metal, and accordingly are hard, tough and strong. They are, in addition, finely finished. The joint is large and firm, and the quadrant is round and is fastened by an improved method. The steel points are thoroughly tempered. On the threaded end of the quadrant, between the adjustable legs, is a knurled nut, against the inside of which a helical spring acts. After the points are adjusted the nut may be turned back against the leg, thus locking it firmly in place. A common pencil fits either socketed leg, while an auxiliary holder is also furnished to fit the reverse end of either point. The maker claims that this is one of the most useful combinations of its kind, as well as the best made tool ever offered to the trade. In the ordinary form it is supplied with head and points 8 inches. These points, we learn, may be extended 2 inches more and in this form will describe a 24-inch circle. The longer points bring the article up to a capacity of a 34-inch circle, while extra long points, which are supplied to order, describe a 44-inch circle.

Adjustable Lumber Hoist.

Every builder engaged in putting up frame structures will appreciate the advantages of the hoisting attachment illustrated

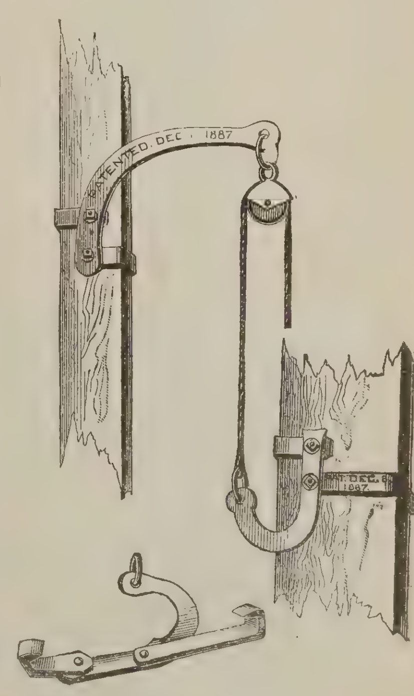
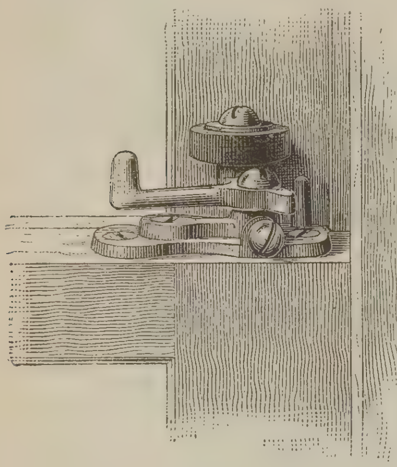


Fig. 3.—Adjustable Lumber Hoist.

in Fig. 3 of the engravings. It is a simple clamp adapted to be attached to any upright post or stud of the frame, and which by means of the curved arm extends outwardly, carrying the block through which the rope runs for hoisting material. A similar clamp is provided for the lower

end of the rope, which engages with the stick to be raised in a way to save all trouble in tying knots or wrapping the rope around the timber. The saving of time in the use of this device is its most important feature. The clamp here shown is manufactued by W. S. Welch, Westfield, N. J., and is of the same series as the ladder clutch illustrated in our issue for December. With reference to the capacity of this device, the maker informs



Novelties.—Fig. 4.—Walker's Patent Sash Fastener.

us that it is adapted to fasten to uprights from 2 x 2 in size to 4 x 6, and that the grip will carry timbers ranging from 2 x 6 to 6 x 12. The small cut shows the position of the device for dropping over the timber ready to hoist up. This will be appreciated by our readers, as already remarked, as a very useful and labor-saving device.

New Sash Locks and Door Checks.

H. Walker & Co., 104 East Fourteenth street, Wilmington, Del., are putting on the market the sash-fastener and door-stop represented in the accompanying illustration, Fig. 4 showing the sash-fastener and Fig. 5 the door-stop. These articles are made under patents obtained by H. Walker. The sash-fastener, Fig. 4, is attached, it will be observed, to the top rail of the lower window sash in the right-hand corner. It has a lever by means of which the rubber roller is operated, and is to be so placed that the rubber roller will press against the center of each side piece of upper sash when the lever is placed in line with the top rail, as shown in the cut. The pressure on the sash thus locks it in any desired position. It will be seen that there is a

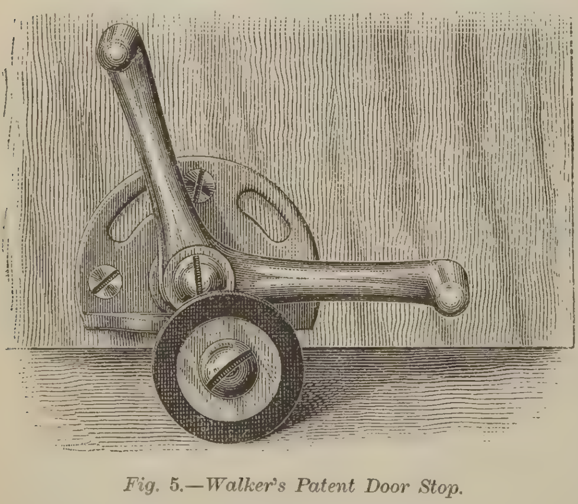


Fig. 5.—Walker's Patent Door Stop.

regulating screw on the outer edge of the base plate, by moving which the pressure can be increased or diminished as desired. This sash-fastener is referred to as having the especial merit of combining in one the qualities of a stop, lock and anti-rattler, and the point is made that by its use the sash can be raised or lowered, or both, and securely fastened as desired, while at the same time by its compression of the sash in the frame it prevents it from rattling. Its applicability on houses and factories where no sash weights are used is also referred to. It will be seen that a similar principle is applied in the door-stop shown in Fig. 5. This door-stop is attached to the bottom of the door as shown in the cut, and when not in service swings freely without contact with the floor. It is worked as indicated by either of two levers which are operated by the foot. By bearing down firmly with the foot on the lower lever the roller brake is applied and the door securely held where desired, while by pushing the upper lever back until it strikes the stop on the base plate, the brake is taken off, the roller being raised from contact with the floor, permitting the door to swing as usual. These door-stops are made right and left hand to suit the direction in which the door opens. This door-stop is referred to as not only stopping the door at any desired point, but effectually holding it there against violent pressure, while it will also serve as a secure bolt when the door is closed. It is referred to as specially applicable to hotels and boarding-houses, where ventilation is often sacrificed to privacy, while it has advantages as permitting ventilation with security from intrusion, as a door can be fastened partially open. Both door-stop and sash-fastener are obviously easily applied. The ordinary pattern of the door-stop is designed for doors which do not swing higher than 1 inch from the level of the floor, while a special pattern is used for doors of higher swing. These articles are both made in malleable iron, japanned, and in brass, polished.

Emerick Dumb-Waiter.

The Butler Hardware Company, No. 18 Warren street, New York, are directing special attention to the form of dumb waiter shown in Fig. 6 of the engravings. It is the invention of Garrett M. Emerick, of Brooklyn, who has assigned his rights to the company. The engraving very clearly shows the features of the article, which is adapted for use in various places. It is particularly useful in flats where coal and other articles are to be hoisted up to the different kitchens by the janitor or delivery clerks. Referring to the box of the waiter, it will be noticed that the shelf is hinged. This is so constructed that the leaf may be thrown up and fastened, thus giving the entire depth to the service of those who employ the waiter. The counter-balancing weights are run in the standard at the right. The other features will be understood by a very brief description. The propelling power is communicated to the large wheel by the hand rope shown in the foreground. The hoisting is done over a drum, located further back in the mechanism, while a brake for instantly stopping the movement, or of checking the

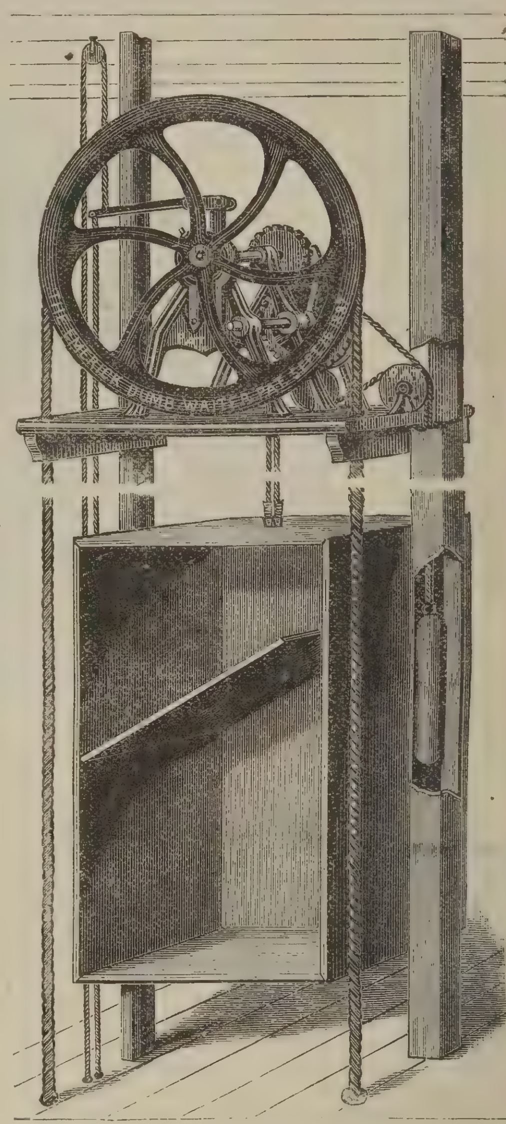


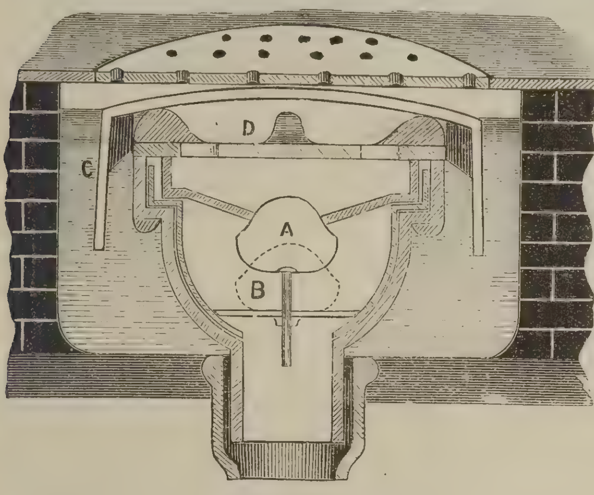
Fig. 6.—The Emerick Dumb Waiter.

motion to whatever degree desired, is operated by means of the rope shown outside of the left-hand standard. The waiter is of a kind that might be described as back-geared. It is powerful in its operations and easily operated; and what is of quite as much interest to our readers, is readily put in place. Very slight provision is necessary to be made for receiving the mechanism as supplied by the manufacturers. The special features which distinguish this waiter from others may be briefly alluded to. The main power-shaft is connected by gearing to the shaft which carries the lifting drum. The drive-wheel and its endless rope is combined by this means with the drum. It will be noticed that there are two ropes, both attached to the car, passing over the drum and a guide pulley connected with the weight. One of these is a little longer than the other, causing the shorter one to bear all the weight. In case it should break, the car and weight are prevented from falling by the slack rope. In this manner the slack rope becomes a perfect safeguard against the falling of the car, for when the working rope breaks it is necessary to put a new one in place. The rope is spread on the drum and the pulley is formed with flanges to prevent the coils from running too far apart. In this manner the portions of the rope which reach from the drum to the car are kept from spreading, which would be liable to shift the weight

of the car from one end of the rope to the other, and thus necessitate too much slack in the safety rope.

Textor's Cellar Drainer.

Figs. 7 and 8 illustrate a cellar drainer and self-closing back-water trap, made by Henry Textor, of Throop avenue, Brooklyn, E. D., N. Y. Fig 7 shows the form of drainer used when the sewer connection is directly underneath, and Fig. 8 when the sewer is at one side. The appliance is placed in the front part of the cellar, at a



Novelties.—Fig. 7.—Textor's Cellar Drainer.—Sectional View of Direct Drainer.

low point where the water will collect, and if the floor is very wet it is sometimes advisable to make small brick channels leading to the drainer. As shown in Fig. 7 the drainer is surrounded by a water-tight basin, built of masonry, though a basin of cast iron may be used instead. The basin is covered with a perforated plate, set flush with the cellar door, through which the water drains. Below the plate is a bell, C, covering the drainer and forming a trap against the entrance of sewer gas. The cover of the drainer consists of a perforated galvanized-iron plate, D, with hooks below, which pass through notches in the flange of the inner basin. Lugs are

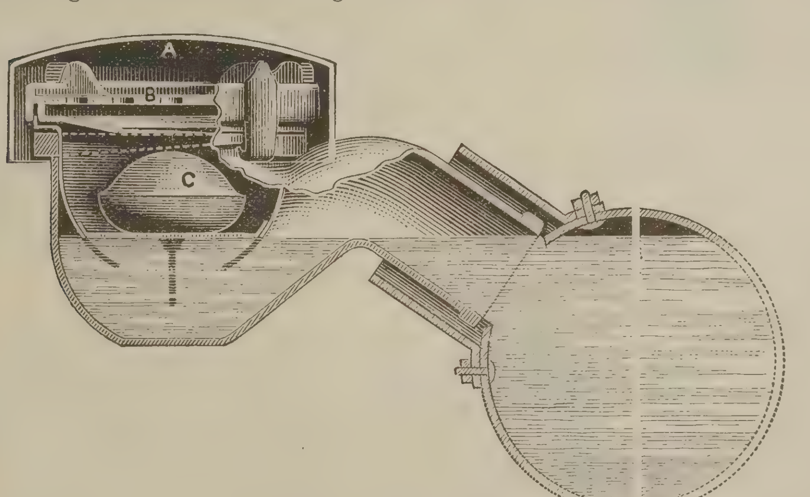


Fig. 8.—Sectional View of Side Drainer.

cast on top of the cover, by which it may be turned; and, by means of the hooks mentioned, wedged fast in position. The cover in Fig. 8, which is similar, shows its construction more clearly. By means of washers a tight joint is secured between the cover and drainer. Beneath the cover is a brass plate with a circular hole in the center through which the water flows out. This hole is closed in case of back flow from the sewer by a cone-shaped float, A, of sheet copper, supported by a stem passing through a cross frame. The cross frame is fastened to a copper shell which forms a lining to the inner basin. With this much description of the device a few words will suffice to explain its operation. The water draining through the perforated plate collects in the basin, and when it rises nearly to the top flows through the holes in the cover D, past the float A, which ordinarily is in the position B, shown in dotted lines, and from there direct to the sewer. It will be noticed that the water will not drain below the level of the edge of the bell C, so that there is constantly a water seal preventing the entrance of sewer gas to the cellar. In case of back flow from the sewer the float A rises to the position shown and prevents the sewerage entering the basin; as soon as the water in the sewer falls the operation of the drainer begins again. Mr. Textor, who is the inventor as well as the manufacturer of this appliance, directs special attention to the shape of the float A, and points out that, as the surface in contact with the valve-seat is so nearly vertical, it is impossible for any sediment or dirt to lodge there and clog it. It will be readiily understood that this drainer is applicable to yards below the street level and other low places where water is liable to collect. Fig. 8 illustrates the form of drainer used where the sewer is at one side. The catch basin, however, is not shown in the cut. This form of drainer is very similar to the one above described, the main difference being the position of the outlet. It is covered with a perforated plate, and the water flows under the bell A, through holes in the cover B, past the float C, and into the sewer. There is a brass plate above the float C, against which the latter rises in case of back flow from the sewer. A noticeable feature of this form of drainer is the double trapping of the water. The bell A forms one trap, while the copper lining beneath the float C is extended below the level of the bend in the pipe, as shown in Fig. 8, so as to form a second trap. A point to be observed in setting these drainers is to have the float spindle vertical, so that it will work freely. Both forms of these drainers are made in 2 and 3 inch pipe. If there is any danger of the trap completely drying up it is advised that a small drip be connected with it so as to make a permanent water seal.

Wigger's Sash-Lift.

We show in Figs. 9 and 10 of the engravings a simple contrivance to facilitate the lowering and raising of one-light sashes. It is well known that a very large propor-

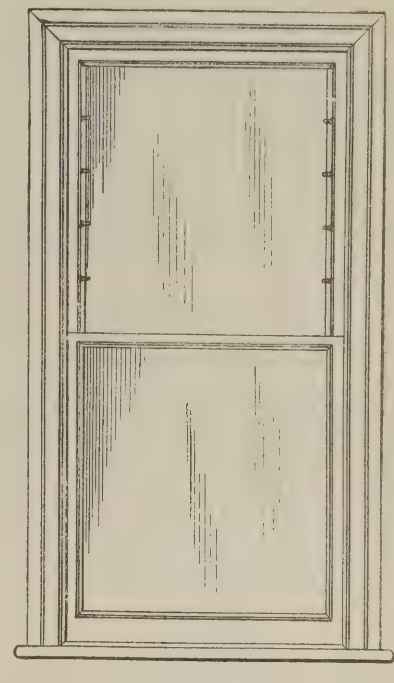


Fig. 9.—Wigger's Sash Lift Applied to Windows.

tion of the buildings of modern construction have windows with sashes having a single pane of glass. Where these are of even moderate size the lowering and raising is attended with considerable difficulty. Particularly is this the case in the matter of the upper sash, which, for the most part, is out of reach. A. Wiggers, 60

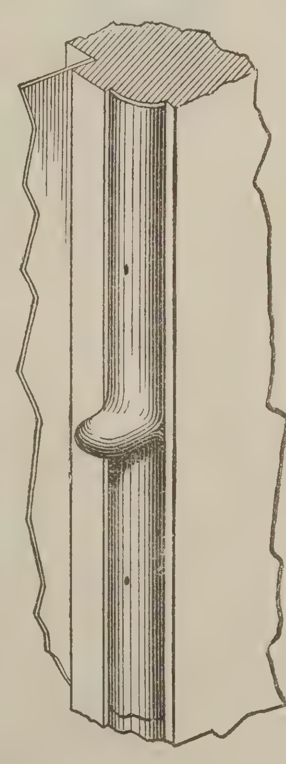


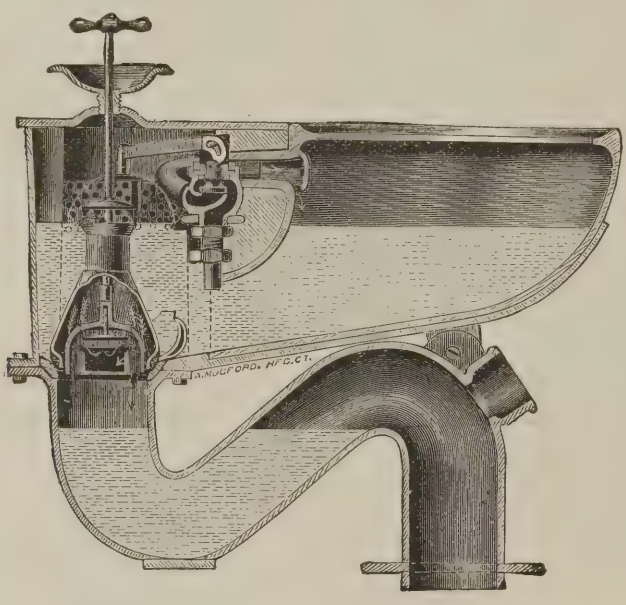
Fig. 10.—Detail of Wigger's Sash Lift.

Nassau street, New York, is introducing a device for use under the conditions named which cannot fail to be of interest to our readers. The larger of the cuts shows the lifter in place, while the smaller cut shows the lifter detached. The lifter is formed of a strip of steel struck into shape to correspond with the bead on the stile or the side rail of the sash, and having

projections or bosses formed in the metal at intervals, against which the thumb may come in the act of raising the sash. These strips are made the whole length of the sash and fit in place over the bead, as shown in the larger cut. Further description than this, we think, is scarcely necessary; for our readers will appreciate the utility of this device without further particulars. Eight sizes, ranging from 28 inches to 42 inches in length, each size having four knobs, are manufactured. They are supplied handsomely japanned in imitation of the woods to which they are to be applied, and also in white enamel for sash painted white. Nickel-plate, brass and bronze can also be obtained, in order to match other metal trimmings of windows.

The Hogan Water-Closet.

The Hogan water-closet, a sectional view of which is shown in Fig. 11 of the engravings, is being put on the market by Peck Bros. & Co., 47 Cliff street, New York, and New Haven, Conn., who are sole agents for the appliance. The chief advantages claimed for this closet are simplicity of construction, freedom from hammering and a trapped overflow in plunger, which obviates all danger of the bowl overflowing. and also forms a perfect seal against the entrance of sewer gas. Water is supplied to the bowl direct, no flush-tank being necessary. The bowl is of the flush-rim type, the valve controlling the supply being shown near the middle of the illustration. In the cut the section is taken through the bowl and plunger, the chamber containing the float which actuates the valve not being shown. At the left side of the bowl is the plunger-chamber, connected directly with it, and in front of the latter is the float-chamber above mentioned. These two chambers are separated by a brass plate perforated near the top, and at the bottom of which is a flap-valve opening toward the plunger. As the water enters the bowl it also rises around the plunger, and after reaching a certain hight overflows the perforated plate and rapidly raises the valve float, which in turn shuts off the water supply. In emptying the closet the plunger is raised by the handle; as the water flows out the flap-valve opens and drains the float-chamber, the float as it descends opening the flushing valve; the remainder of the operation then proceeds automatically. An especial feature of this closet, it will be noticed, is the rapid closing of the flushing valve. The valve remains open to its full extent, giving a copious flow of water while the bowl is filling, and at the end closes suddenly. There are certain features about the construction of the flushing valve and overflow valve in plunger for which particular merit is claimed, and attention is also directed to the fact that the dividing plate between the two side chambers prevents the soil from clogging the valve mechanism. We are informed that a number of these closets, without tank or pressure regulator, have been in use for six months in a city where the water pressure varies from 90 to 120 pounds, and are giving perfect satisfaction. The Hogan water-closet is furnished with trap, offset or straight outlet and with vented bowl or enameled valve section.



Novelties.—Fig. 11.—The Hogan Water Closet.

The Nightingale Floor.

A form of floor to which the attention of architects in New York and vicinity, as well as the attention of many builders, has recently been drawn, is known as the Nightingale Floor and is shown in Fig. 12 of the engravings. It is, we believe, an English invention, and has been recently brought to the attention of the American building trades. It was prominently exhibited at the fair of the American Institute last fall, and the manufacturers, Nightingale & Co., at their offices, which are located at No. 132 Nassau street, show specimens of the floor laid under varying conditions. The circular of the company before us contains a very long list of buildings in England and Ireland where the floor is in use. By reference to the cut it will be seen that the floor consists of wood laid over concrete. In other words, the system is a means of obtaining a wood floor over fire-proof construction and at the same time avoiding the use of sleepers of any kind, the decay of which so frequently causes annoyance. The floor is in the nature of parquetry, and is put in place over the concrete by bedding in a peculiar composition of mastic or cement concrete. By reference to the engraving it will be seen that the wooden blocks have a dovetail shape imparted to their lower edges. By this construction the wood is thoroughly cemented to the concrete, and at the same time the blocks are attached to each other. After the floor has been laid the surface is finished by planing and polishing. The work is susceptible of variations in patterns, covering the entire range of shapes known in parquetry. The company direct attention to the shape imparted to the blocks, since it is of a character to use wood most economically. Each separate piece is bedded by itself in the antiseptic composition which is employed. By this plan of laying, the pieces are put in place so solidly that, it is claimed, it is a matter of impossibility for them to be lifted without the aid of a hammer and chisel, and not even then without destroying the block. The floor thus laid forms a solid, compact mass, that is sound-proof, damp-proof and unyielding—that is to say, there is a slight elasticity resulting from the bedding composition which forms, as it were, a sort of cushion under the wood blocks. This, the company claim, gives a better result than perfect rigidity and secures more evenness and economy of wear. The construction is impermeable alike to damp and dust, air and water, and is therefore to be commended on sanitary as well as other grounds. The effect to the eye is pleasing and attractive. In addition to the floors being laid as described in concrete, the same plan is available in the case of an ordinary wood floor laid above joists—for example, in the case of chamber floors in a dwelling. The herring-bone pattern, which is the favorite with the company, they say, is always satisfactory for such a purpose. Among the buildings which contain samples of this floor in New York and vicinity, the company mention the Niagara Insurance Company's office, 135 Broadway, New York; Wilson's new café, 308 Fulton street, Brooklyn; the office of Dr. Wunderlich, together with other portions of his residence, 165 Remsen street, Brooklyn, and the club-house, 153 Pierpont street, Brooklyn. This invention received a reward from the American Institute at its recent fair.

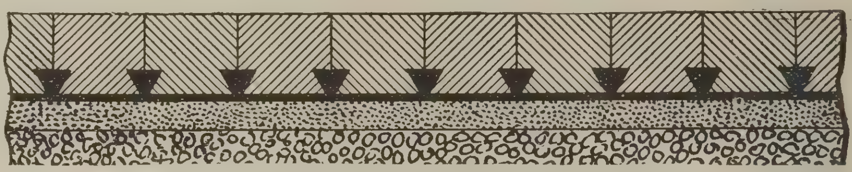


Fig. 12.—The Nightingale Floor.

Moore's Concave Nail Set.

The Moore & Barnes Mfg. Company, 103 Chambers street, New York, and Phœnix, N. Y., are putting on the market the concave nail set, represented in Fig. 13, given below. The special feature of this nail set is indicated in its name, it having a concave end, a construction which is referred to as preventing the set from slipping off the head of the nail. The fact that it is not liable to become dulled like the pointed is also referred to. The nail set is described as made from the best tool steel, finely tempered and drawn to a blue finish. It is made in four sizes.

Fig. 13.—Moore's Concave Nail Set.

Masonry.

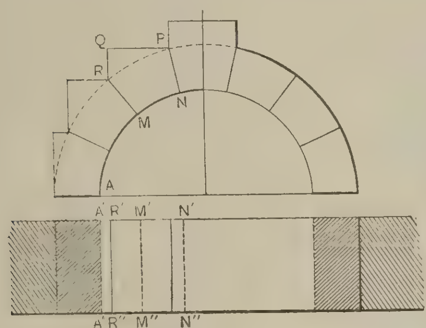
Masonry and Stone Cutting.

(Continued from page 20, January.)

RIGHT SEMICIRCULAR ARCHWAY.

As the simplest example of cutting cylindrical surfaces, we shall take a semicircular archway. Such an archway of freestone in a brick or rubble-wall is sometimes finished by a circular extrados concentric with its soffit, as in Fig. 13, right-hand side; but more often the stones are finished by a horizontal surface, P Q, and a vertical joint, Q R, as on the left-hand side of Fig. 13. It is such a voussoir, M N P Q R (see elevation, Fig. 13), we intend to cut.

Firstly, we must select from the quarry a block of stone (Fig. 14) forming a prism, the length of which will be more than equal to the thickness A′ A″ of the wall,



Masonry and Stone Cutting.—Fig. 13.—Right Semicircular Archway.

and the base $k\ n''\ l\ i$ of which will contain the vertical elevation of the voussoir; but it is not necessary that the head of the stone should be a rectangle. We begin the work by forming the plane $k\ n''\ l\ s$, and we draw thereon the head $m''\ n''\ p''\ q''\ r''$ of the voussoir, taking care that the side $n''\ p''$ coincide with the bed of the stone, as this side is one of the bed joints of the voussoir. As all the voussoirs are identical in shape from the dotted extrados to the soffit, it will be better to use a mold in cardboard cut out to the shape R M N P, and then the workman will only have to draw on the stone the lines P Q and R Q.

Now, we shall work by the help of a square the surfaces of the bed joints—that is, the surfaces $k\ h\ n'\ n''$ and $r''\ r'\ m'\ m''$. Then on the surfaces we draw the outlines of the bed joints of the voussoir, such as $p''\ p'\ n'\ n''$, and using the arrises $p'\ n'$ and $r'\ m'$ as guiding lines we work the other

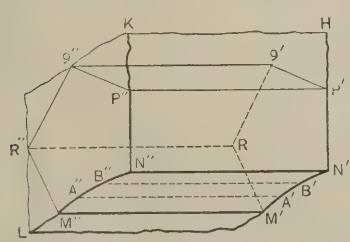


Fig. 14.—Selection of the First Stone.

end of the stone to a plane. We draw again on this last plane, $m'\ n'\ p'\ q'\ r$, the outline of the head of the voussoir, and then complete the two remaining planes, $p''\ q''\ q'\ p'$, and $g''\ r''\ v'\ q'$. The cylindrical soffit can be finished nearly as easily as a plane by the help of a straight-edge and the two guiding arcs $m''\ a''\ b''\ n''$ and $m'\ a'\ b'\ n'$ (Fig. 14).

The next problem we shall present is to construct a semicircular archway in stone, penetrating into a semicircular concrete vault, the outside face of the wall being on the batter, and not parallel on plan to the inside face. We have selected this peculiar arrangement in order to handle the problems of stone-cutting in their general bearings with every difficulty which may occur, the usual dispositions of walling being but special, although simpler, constructions. At all events, such a structure as the one proposed might occur in forming an opening through a river wall into a tunnel placed under the roadway. The reader will observe that

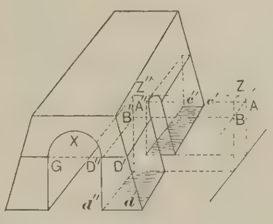


Fig. 14a.—Perspective Sketch Illustrating the Next Problem.

we have in this structure only to cut voussoirs with a plane face at one end and a cylindrical one at the other, and that we have not to connect these voussoirs with others, as would have been the case if the vault had been constructed of stone instead of concrete.

The perspective view or, rather, axonometric projection, Fig. 14 *a*, may help the reader in getting a clearer idea of our structure. The semicircular vault of section G X D″ is carried on one side by a wall, the interior face D″ d' of which is vertical, whereas the exterior face D′ d is on the batter; and, as stated, the outside groundline $d'\ c$ of this wall is not parallel to the inside line $d'\ c'$. The axis of the archway is perpendicular to the interior face of the wall; its section is semicircular, as shown in A Z B, and its springing line, A B, is on the same level as the springing line of the vault. It is evident that the outline of the archway on the outside face of the wall will be an ellipsis, for it is the intersection of a cylinder by a plane not perpendicular to its axis. On the other hand, the intersection of the archway with the vault will be a line of double curvature, as shown by dotted line A″ Z′ B′, Fig. 14.

(Fig 15). In making the working drawings for cutting the stone voussoirs, we leave out the walls that support the vault, and take our plan at the level of the springing line common to both vault and penetrating archway. We select for our elevation a plane perpendicular to the axis of the archway, and thereon draw the semicircular archway and its voussoirs as if we had to deal with any ordinary archway. On plan the arrises of the bed joints will be parallel to the axis of the archway, and we have only to find out the points where they are terminated either by the exterior face of the wall or by the surface of the vault.

We shall describe only the process of drawing one voussoir—say the one projected vertically on the pentagon M N P Q R, as the operations carried out for this voussoir have but to be repeated for the other voussoirs to get all the stones which form the archway. The voussoir being a prism contained entirely between the face

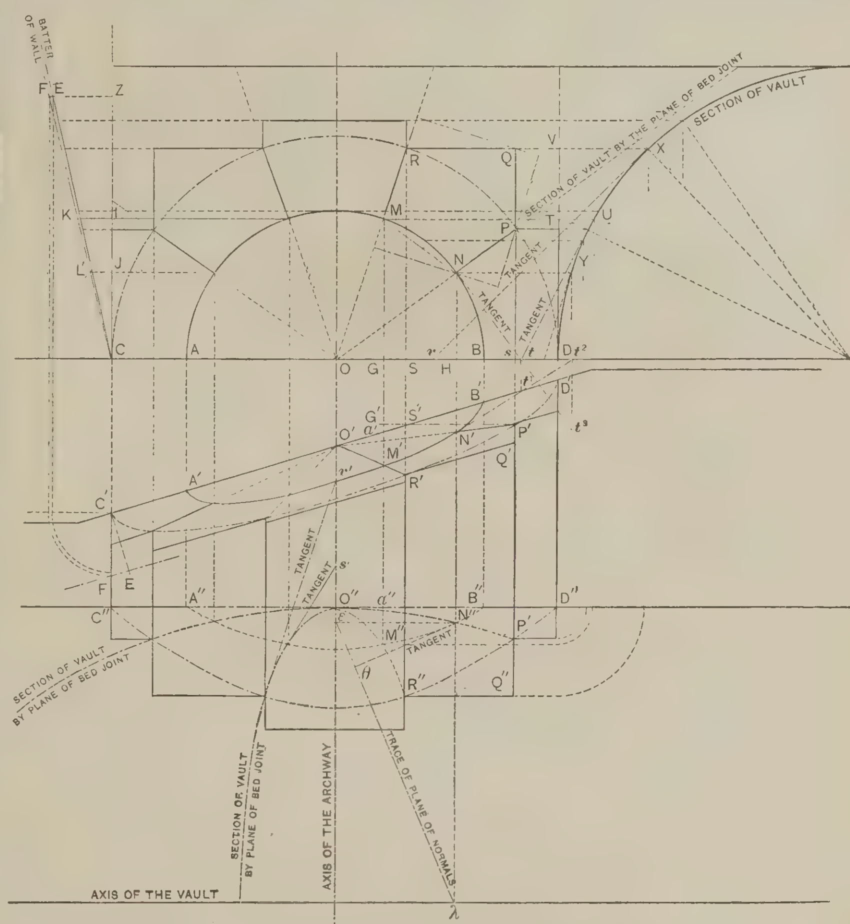


Fig. 15.—The Working Drawings.

of the wall and the surface of the vault, to delineate it completely we have only to find the intersection of its sides with the face of the wall and the intrados of the vault.

To get the intersection with the wall face, we produce through a point, C, two sections of the wall, the one by a vertical plane on trace C′ E′, the other by another vertical plane on trace C F′ (see plan); the one is perpendicular to the wall face, the other is parallel to the axis of the archway. The first section on C′ E′ is given by the batter of the wall, and we can at once draw it in C E on the left side of the elevation. The second section on C′ F′ can be deduced from the first, for we know that E′ F′ parallel to the wall face is the plan of a horizontal line, E F. If Z on the elevation shows the hight of the horizontal line E F, we will be able to mark the points E and F, through which each section of the wall face will pass.

Thanks to this preliminary operation, we shall be able to draw the intersection of the voussoir by the wall face. Take, for instance, the arris of the voussoir projected vertically in M″ and horizontally on the line G a' M′. To get the point M′ we cut the wall by a vertical plane, of which G a' M is the trace. This section will be a straight line, forming, with a vertical line produced in a', an angle equal to the angle Z C F, and, therefore, we can conclude that the distance I K produced on the elevation at the level of M will be equal to a' M′ on plan. Such is the simple operation by which we readily find not only the angles of the voussoir on the wall face, but any number of intermediary points by which we can delineate the curved portions thereof. If we repeat this operation for all the voussoirs, we shall have drawn on plan the horizontal projection of the head of the archway with the curves of intersection of the intrados and extrados. These curves are portions of ellipses of which we have conjugate diameters, the one the trace A′ B′ of the wall, the other the axis of the archway itself; this allows us to draw also these curves direct without reference to the elevation.

To determine the horizontal projection of the other end of the voussoir, the one which forms part of the surface of the vaults, we draw on the right-hand side of the elevation the section D U X of the vault; the distance T U taken at the level of the arris M will give us the distance a'' M″ on the plan. We can by this method get the intersections of the arrises of all the voussoirs, and by joining these points of intersection we get on plan the curves of penetration in the vaults by the intrados and the extrados of the archway. It is useful to know, although it can only be proved by algebraical calculation, that these curves on plan are hyperbola, the axes of which are the axes of the intersecting cylindrical vaults. It is evident that the planes of the bed joints of the archways cut the vault according to elliptical curves. These may be drawn with the help of intermediary lines taken on the surface of the bed joints between arrises; but considerable help is obtained in drawing curves by the knowledge that their prolongations must all pass through the point O″ on plan. As shown in our drawing, the axes of these ellipses are easy to find, which allows of delineating the curves mechanically with the help of a trammel.

Curves of large dimensions are more easily drawn with the help of a few points and tangents to the curve than by getting a great number of points with the assistance of tangents; for this reason, we show how tangents to the various curves which occur in masonry are to be found. For the curve of the archway on the exterior face of the wall, tangents to any point, such as N′, are readily obtained. The vertical projection N t of such a tangent is tangent to the elevation of the archway, and it cuts the trace A′ B′ in the same point t' as the plan of the tangent, which is therefore N′ t'. A similar method can be used for finding tangents of the elliptical curves formed by the intersection of the volute and the bed joints. If we consider the section of the vault as an auxiliary elevation, the tangents to the vault in the points U and X are elevations of the tangents to the curve of the intersection of the bed joint M R in the points M″ and R″. The tangents being contained in the plane of the bed joint will, of course, meet the axis of the arch, and if we make O″s' = Ds and O″v' = Dv, we shall get the points s' and v' through which the tangents pass.

The tangents in points of the curve of intersection of the arch and vault can be found in the ordinary way as the intersections of the planes tangent to both cylinders, the arch and the vault. If the tangent in the point N″ were required we might produce the tangent to the point Y on the section of the vault, and the point where it would cut the ground line A D would give us the distance from D where the trace of the plane tangent to the vault would pass. The same operation, carried out for the point N itself on the archway, would give us the trace of the plane tan-

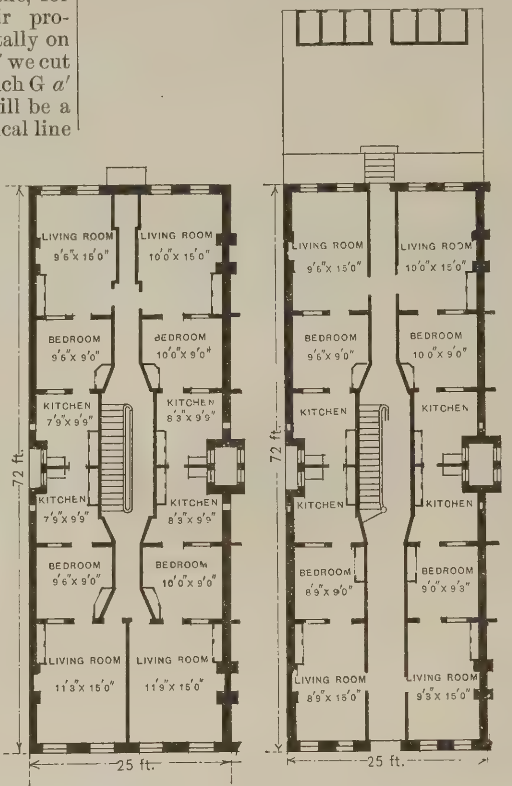


Fig. 3. Fig. 4.

Plans Approved by the Board of Health Under the Law of 1879.

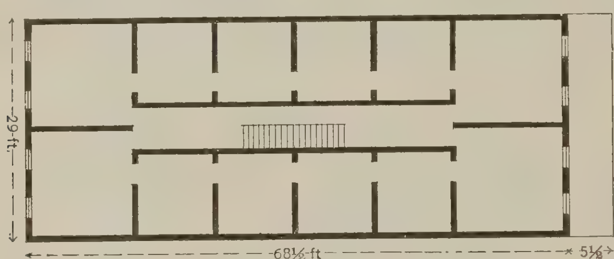


Fig. 1.

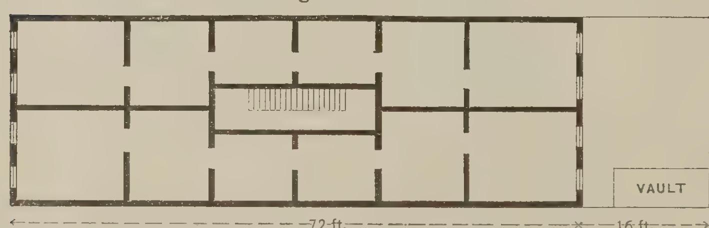


Fig. 2.

Tenement House Plans.—Typical Arrangements in Vogue in New York Prior to 1879.

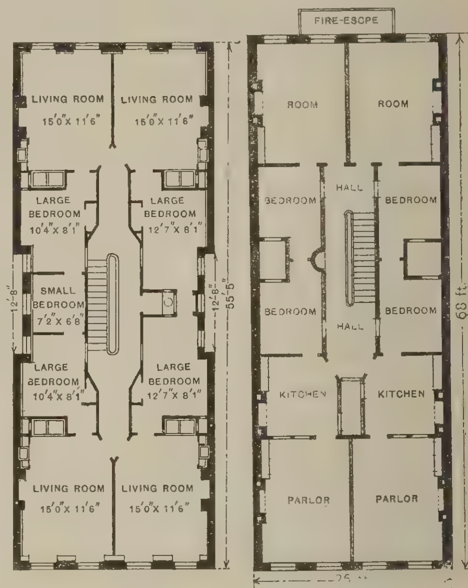


Fig. 7. Fig. 8.

Plans Showing Interior Rooms Lighted and Ventilated.

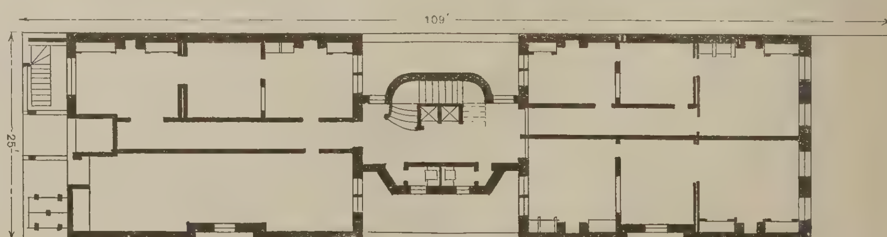


Fig. 5.—First Floor.

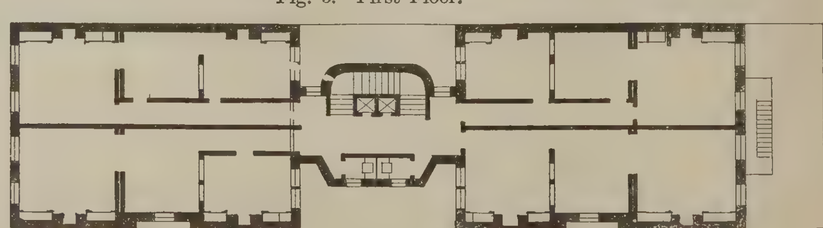


Fig. 6.—Upper Floors.

First Prize Plan in a Competition Conducted in 1879.

gent to the intrados of the arch. The intersection of these two traces would of course be a point of the tangent required, and the point N'' would be another. But this operation is inapplicable to the starting points A'' and B'' of the curve, for in these the two tangent planes are vertical, and their intersection on plan is all projected in one point. Besides this deficiency the former operation is longer than the following, which is applicable to all points alike.

The rapid method of finding tangents is based on the fact that the plane of a tangent to a curve of intersection is perpendicular to the trace of the plane which contains the normals in the same point to both the intersecting surfaces. The normal to the surface of the archway in the point N'' is projected on plan in N'' ε, of which ε is the foot on the ground plan taken at the level of the springing line. Likewise the normal to the vault is on plan N''λ, of which λ is the foot; therefore the line ε λ is the trace of the plane of the normals. We can now produce the plane of the tangents, N''θ perpendicular to ε λ, which is all we require to guide us in drawing the curve.

(To be continued.)

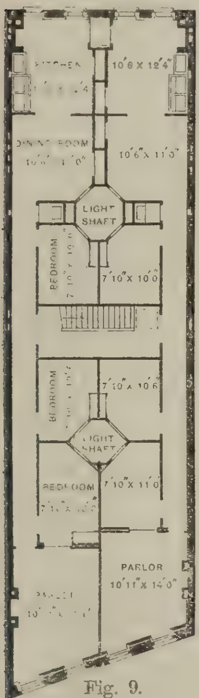


Fig. 9.

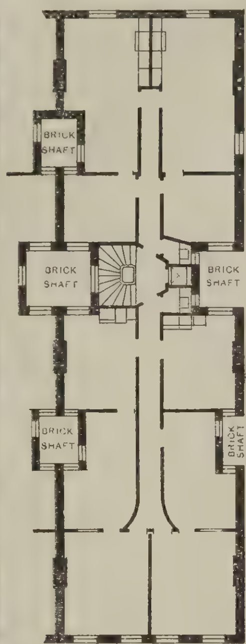


Fig. 10.

Plans with Enlarged Studded Light Shafts and Better Ventilation.

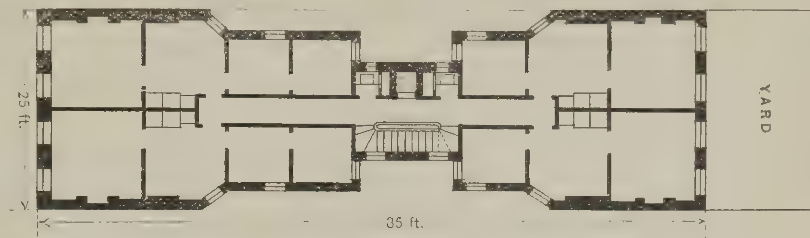


Fig. 13.

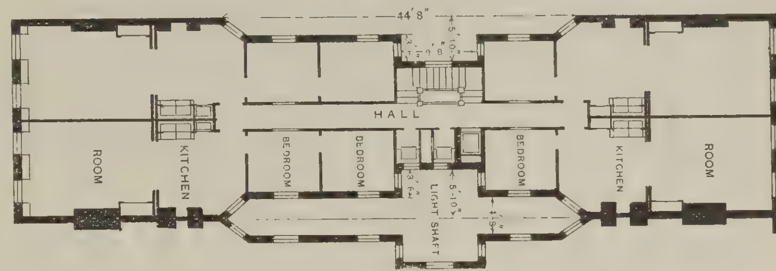


Fig. 14.

Present Type of Tenement for Four Families on Each Floor. Adapted to Lots 25 x 100 Feet.

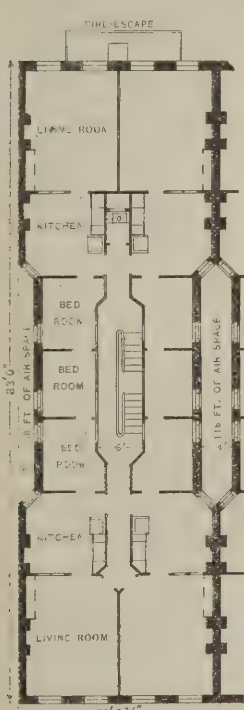


Fig. 11.

Type of Tenement with Open Courts Instead of Studded Light Shafts.

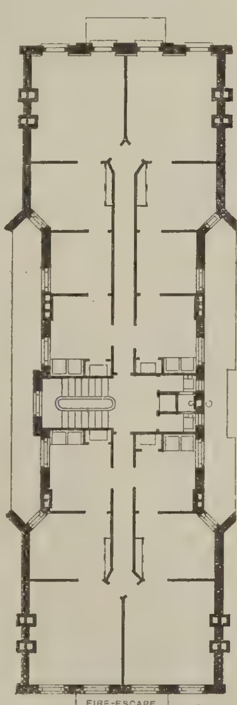


Fig. 12.

Improved Tenement with Water Closets and Lighted Halls and Stairs.

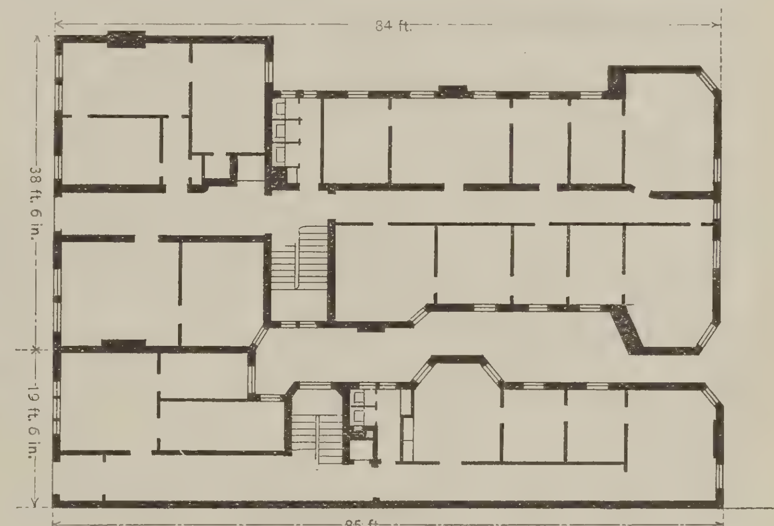


Fig. 15.

Approved Tenement Built in 1887.

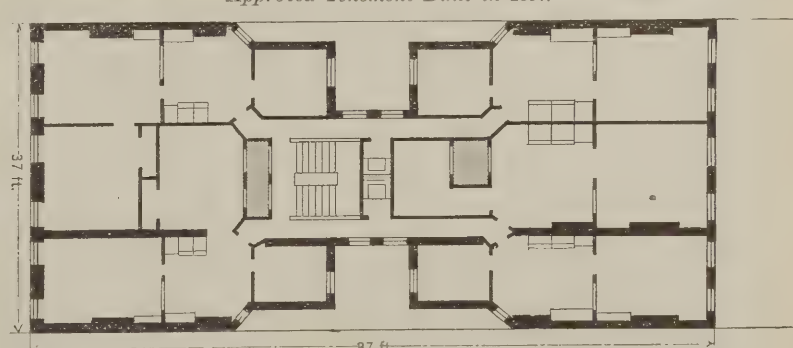


Fig. 16.

Approved Tenement Built in 1887.

Tenement Houses.

The conditions of life for the laboring classes in a large city can scarcely be comprehended by those who have always lived in the country or in the smaller towns, where every workman has his own house, and perhaps in addition thereto a garden. A very large percentage of the population of New York is forced by circumstances to live in what is commonly called "tenement houses." These institutions, while at present far better in their sanitary conditions and in all respects than formerly, are as unlike the homes to be found in the country as can be imagined. The greed of landlords, real estate owners and speculative builders in a city like New York, where real estate is constantly advancing in value, leads to reckless building and a disregard of light and ventilation in putting up houses of this class that produce disastrous results. It is only within the last few years that buildings of this kind have been regulated by law in New York. Matters had come to such a pass that the health and welfare of the community at large demanded either State or municipal supervision. Tenement houses very properly come under the charge of the Board

of Health, and from a report recently issued by James C. Bayles, President of the Health Department of New York, prepared for the information of the "Commission on Legislation Affecting Tenement and Lodging Houses," there may be gained an idea of what has been accomplished in the interval since tenement houses first came under legal restrictions. At present, plans of buildings must be approved by the Board of Health before the builder can commence his operations. A long series of steps have led from the condition of affairs that prevailed prior to the enactment of regulations relating to these matters and the present desirable system of efficiency. An inspection of tenement houses was ordered in 1879, and on this foundation what has been done in the city of New York since has been based. In Figs. 1 and 2 of the illustrations presented herewith, all being borrowed from the report in question, there are shown typical plans for dividing buildings for tenement-house purposes in vogue prior to this year. The interest that was excited in the tenement-house question by the inspection led a public-spirited citizen at that time to offer prizes, and a competition was conducted. Figs. 5 and 6, shown upon this page, represent the first prize plan in the competition referred to. Figs. 2 and 3 show plans which were approved by the Board of Health under the laws of 1879. It took some time to get into operation a law which was opposed alike by builders, landlords and landlords' agents, and it was some time after 1879 that the features which characterize tenement houses of the most approved class at present were introduced. Figs. 7 and 8 show interior rooms lighted and ventilated; Figs. 9 and 10 represent plans with enlarged studded light-shafts which afford better ventilation than those which preceded; Fig. 11 shows a type of tenement house with open courts in the place of studded light-shafts, while Fig. 12 shows an improved tenement house with water-closets and lighted halls and stairs. The problem of building a structure upon a 25-foot lot, subdividing the plans so as to accommodate a number of families on each floor, and yet affording to all a proper amount of light and ventilation, and yet securing a large return upon the money invested, is one of no mean proportions. With the law demanding for the tenant certain rights on the one hand, and the landlord surlily yielding as little as possible on the other, improvement must necessarily be slow. Figs. 13 and 14 illustrate the present type of tenements for four families on each floor, adapted to lots measuring 25 x 100 feet. In Fig. 15 we illustrate an improved tenement that was built in 1887. Here it will be seen that increased light and air space is secured, and that ingenious methods have been adopted by the designer to make the space as small as possible and yet secure the best possible results. Fig. 16 illustrates another approved tenement recently built, and which is altogether unlike the one shown in the previous illustration. Contrasting Figs. 15 and 16 with the earlier figures of the series, it will be seen that much progress has been made in working out the problem of sheltering the working population in the metropolis. We would not be far from the truth if we were to say that the present condition of tenements built under the supervision of the Health Department is better, from a sanitary point of view, than that of many private dwellings erected at the same time in different parts of the city. However, reform in this direction has gone, to a certain extent, hand in hand with the other, and it is rare indeed that private dwellings at present are put up in which there is not careful attention paid to sanitary requirements. The plans presented on pages 44, 45 form an interesting study, and much more than we have said might be laid before our readers concerning them. However, they tell their own story to the best advantage, and we commend them to the studious reader for careful consideration and comparison, one with the other.

TRADE NOTES.

THE CATALOGUE of E. C. Stearns & Co., of Syracuse, N. Y., is a pamphlet of 71 pages, printed on finely finished plate paper, and bound in a flexible cover of good quality. The various specialties shown in this catalogue are of the utmost interest to mechanics, and to builders in particular. A full-page engraving, near the front of the book, gives a general view of the works of the firm, from which the reader gains an idea of their extensive operations. The goods shown embrace door-hangers in a large variety of kinds; sliding door locks; window screen frames and fittings; adjustable registers; hammock-hooks; clothes reels; jack-screws; casters; well-wheels; hay-fork pulleys; slop hoppers; sinks; saw vises; bench-screws; bench-hooks; screw clamps, and numerous small tools. Near the end of the book some specialties in stable fixtures are shown.

THE SIMONDS MFG. COMPANY, of Fitchburg, Mass., and Chicago, Ill., send out the first of the year a very handsomely engraved calendar card with monthly sheets. A circular saw, done in the very highest style of the steel engraver's art, is a conspicuous feature of the illustrations on the card; while two band-saws also serve to indicate the line of trade followed by this company. The engraved legends upon the card contain a list of the specialties which the company manufacture.

WE ARE INDEBTED to Samuel H. French & Co., Paint Manufacturers, York avenue, Fourth and Callowhill streets, Philadelphia, Pa., for a copy of their 1888 catalogue. It is a handsome octavo pamphlet of upward of 200 pages. The illustrations, which include many other things besides paint materials are excellent in character and the book throughout is of interest to our readers. Architectural plaster work, papier-maché and fibrous plaster centers are the first article described and occupy some 34 pages. Brackets, caps, corbels and keystones are similarly treated in 10 pages, after which Corinthian capitals and keystones are presented. What is described as patent cornices for interior ornamentation is then introduced and numerous designs are presented. Ornamental frieze work, enrichments and ceiling panels are then shown, including some very handsome designs for complete ceilings. Slate mantels are next shown and many very elaborate designs are presented. These illustrations take the reader to page 118 in the book. Grates are next introduced and are shown in a very large variety, and there are also presented numerous designs for open fireplaces for wood. Cut glass is the next department, after which follows embossed glass and leaded glass. A few pages at the end of the catalogue are devoted to the special cements which this firm handle; also painters' materials and colors for mortars. The third page of the cover is devoted to a description of the departments maintained in this establishment. We will enumerate them, because they are of interest to our readers The first is the architectural ornament department, which relates to such goods as centers, cornices, ceiling ventilators and whatever can be made out of plaster, papier-maché, &c., for interior decoration. Next is the cement department, in which are handled many of the leading lines of cement used in this country. The glass department embraces all branches of the glass business. The reader is informed that the firm have every facility for promptly executing orders for plain and ornamental glass of every style. The grate department we have already referred to in considering the classes of illustrations in the catalogue. We have also referred to the mantel department. The modeling department is conducted for the purpose of executing special designs for architects and others upon the shortest notice. In the paint department, we are informed, everything pertaining to the paint line is kept. In the plaster department, various well-known and special brands of plaster are handled, and masons supplies in general. One of the most recent departments to be opened is the tile department, in which the firm make a specialty of getting up unique designs for mantel facings, hearths and vestibule floors. They also enumerate an inquiry department, which is conducted for the convenience of the customers of the house, who are invited to communicate with the firm whenever in want of information in their line or kindred branches.

THE BRATTLEBORO TOOL COMPANY, of Brattleboro, Vt., announce that they have sold their entire stock of planes and the good will of their business to C. E. Jennings, of 79 Reade street, New York. They also give to this firm the control of the manufacture and sale of their improved and perfected extension bit. In the circular which they have issued they state that this bit is equal in every respect to the best, and superior to all in the patented mode of adjusting and holding the cutters.

THROUGH THE COURTESY of Mr. A. J. Dunton, General Manager of the Bardiglio Marble Mfg. Company, Rutland, Vt., we have the statement of some recent operations of the company, and also a stereoscopic view showing the company's works, with the railway in the foreground, and a clear indication of the excellent shipping facilities which they enjoy. The company are quarrying a very excellent quality of marble, which greatly resembles the "Bardiglio," which is imported. We are informed that no other worked quarry in this country has ever produced the equal of what this establishment is now turning out. It is well adapted for the interior finishing of public buildings. The Murray Hill Hotel, New York; also the Fifth Avenue Hotel and the New York Stock Exchange, have used Marble from this concern. Fine work is also shown in Haverhill, Mass.; in the Laclede Building, St Louis, and in numerous other places that might be mentioned.

THE STATE HOUSE COMMISSION, Columbia, S. C. under date of January 11, 1888, advertised for a resident superintending architect for carrying on the work on the State House, which is now in progress. We understand that the gentleman who occupied this position last year did not reside in Columbia, but that it is deemed to the interest of the work in question to have a resident superintendent. Applications are to be received to February 1 We regret that this notice will come before some of our readers at too late a date to make use of the information conveyed.

WOOD CARVING is very fashionable at the present time, but like many other good things, real carvings are expensive. This fact lends interest to the card of the Charles W. Spurr Company, of 465 East Tenth street, New York, who state that they are putting upon the market exact counterparts of wood carvings, which neither warp, shrink, swell nor split, and which can be offered at a far less price than the cost of original carvings. They have recently issued a very attractive pamphlet containing numerous designs, which they are prepared to send to all applicants. We have seen numerous specimens of the work produced by this company, and can testify to its excellence. It is a marvel that wood can be made to take the forms which this company succeed in imparting to it.

MERCHANT & Co., of Philadelphia, are pre-eminent for their enterprise in catering to the expressed wants of architects and builders in the matter of roofing plates. In one of the cards which they publish in this issue they present the five steps which comprise their record from 1884 to 1888, inclusive. In the earlier year mentioned they issued their first guarantee with roofing plates; in 1885 they began to stamp the sheets of their two leading brands and ceased the importation of the wasters of the better of the two plates. General improvements made in the character of the coating of one of the plates in 1886, while in 1887 they note that they ceased the importation and sale of the wasters of the second plate. In this year each box of the two plates was stamped with the average net weight of the plates. For 1888 they announce that they shall mark the actual net weight of the plates in each box. This last step, we think, is the most important of the series, and is worthy of the consideration of every architect who has the specifying of roofing plates.

CHARLES A. STRELINGER & Co., of Detroit, Mich., suggest to our readers this month the expediency of looking back over the files of last year, so far as their advertisements are concerned. We presume if the reader takes the trouble to do this, and compares one with another, he will be astonished by the large variety of tools which this firm are supplying to the trade at large, either across the counter or by mail.

SEVERAL ILLUSTRATIONS of foot and hand-power machines appear in the card of the Seneca Falls Mfg. Company, Seneca Falls, N. Y., published in this issue. The number of shops throughout the country which are employing foot and hand-power machinery in successful competition with steam-power is increasing in a rapid ratio. The devices which this company are putting upon the market are, accordingly, of the utmost interest.

SNEDEKER & VOORHEES, Jamesburg, N. J., assert that it will pay every wide-awake carpenter, pattern-maker or wood-worker of any other trade to send for the catalogue of the combined foot, hand or steam-power machines which they are manufacturing. They mention, incidentally, that these machines are well adapted for the instruction of students in schools, as well as for actual shop use.

J. G. WITTE & BROTHER, 75 Chambers street, New York, invite the trade to send for circulars of Becker's Interchangeable Door Spring and Check, which they are introducing. This device is described as strictly mechanical; made entirely of steel, with interchangeable parts, and so arranged as to be noiseless in operation. There are no air cushions. It is said to be specially adapted for use on front doors of apartment houses.

WE HAVE REFERRED in the past to the quality of the tools put out by the Gage Tool Company, of Vineland, N. J. A special feature is the excellent temper that is given to their plane irons by a process of their own invention. A favorite plan of showing the quality of the tool is to cut a thin shaving from a hard hemlock knot, and then to show that the bit is in as good order as when it was put in place

THE PEERLESS BRICK COMPANY, 1003 Walnut street, Philadelphia, announce in another part of this issue that they are manufacturing 500 different shapes of bricks; all from thoroughly tempered clay. Their works are very favorably located, so that bricks for all parts of the country are loaded direct from the yard. Their illustrated catalogue is sent to all applicants.

A GAUGE with a graduated scale, applicable to draw knives for use in chamfer work, is being introduced by J. H. Hoague, of Chicopee, Mass. The article is illustrated in the maker's card, which appears in another part of this issue.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE State Association of Architects of Missouri held their annual convention for the year 1888 a few weeks since at Kansas City, Mo. Among the matters discussed were the compulsory examination and registration of architects competent to practice in the State; the amendment of mechanics' lien laws, so as to extend their benefits to architects; the adoption of a uniform system of measurement in estimating quantities in building, based strictly upon the amount of material without the conventional surplus and double measurements claimed by mechanics, and the proposed fusion of the American Institute of Architects and the Western Association of Architects in one national body. A committee on jurisprudence was appointed with instructions to gather legal data, with reference to their rights and duties in their relations with contractors, material men and mechanics, and to devise a practical scheme for securing the services of a competent lawyer to act as attorney for the association, to advise its members, on request, on their rights and duties, and to be prepared, when necessary, to maintain their interests by legal process. Several new members were announced, and the following officers for the new year were elected: C. K. Ramsey, of St. Louis, president; E. F. Fasset, Kansas City, secretary, and C. E. Illsley, St. Louis, corresponding secretary. The next convention is to be held in St. Louis in January, 1889. An interesting feature of the convention was a display of architectural drawings in color and in black and white, contributed by draftsmen and architects of Kansas City.

THE National Association of Builders held their annual convention during the early part of February. They met in Cincinnati on the 7th of February and closed their deliberations on the afternoon of the 9th. We have not space for a full report of the business transacted, but would preface the remarks which follow by the general assertion that the meeting in all particulars was a success, that it was largely attended, and that the movement, while a new one in age, is certainly a strong one. The opening address of the president, J. Milton Blair, of Cincinnati, reviewed the condition and work of the association in the interval since its organization. The Committee on Statistics, of which George C. Prussing, of Chicago, was chairman, submitted a voluminous report. This related to the condition of business and to the condition also of laborers and mechanics. The Committee on Legislative Matters, through Marc Eidlitz, of New York, submitted a report on permanent arbitration, also on the rules and conditions under which estimates should be submitted by contractors in the building trades, and rules for estimating work on the apprentice system and on uniformity in lien laws. The main point of the report was the establishment of a national system of arbitration. A special committee on uniformity of contracts, which was appointed at the last meeting, recommended that a committee of three be appointed to act with the Western Association of Architects and the American Institute of Architects. This recommendation was adopted. A resolution was offered asking that the association agree upon a uniform size of brick. In the matter of rules of estimating work and the conditions under which estimates should be submitted, the radical proposition was made that all invited bidders should be compensated for their time in bidding, and a schedule of prices for this purpose was submitted. When security is demanded from a contractor on a building a like amount of security should be demanded from the owner. During the session of the convention several important papers were read. Among these may be mentioned one on plumbing, by George R. Phillips, of Providence, R. I.; one on advances made in brickmaking, by J. C. Adams, of Indianapolis, Ind.; one on carpentry, by William Goldie, of Chicago, Ill.; one on paint, by J. C. McCarthy, of Chicago, Ill., and one on advances and improvements made in roofing, by E. E. Scribner, of St. Paul, Minn. The election of officers for the new year resulted as follows: President, John S. Stevens, of Philadelphia; first vice-president, Edward E. Scribner, of St. Paul, Minn.; second vice-president, John J. Tucker, of New York; secretary, Wm. H. Sayward, of Boston; treasurer, George Tapper, of Chicago. The next meeting is to be held in Philadelphia.

THOSE of our readers who pay any attention to the daily papers must be aware that, at the present time, there is quite a controversy with reference to the condition of the ceiling of the Assembly Chamber in the new Capitol building at Albany, N. Y. This ceiling, which is of stone, vaulted, has been the subject of discussion for a long time past, and conflicting remarks, first with reference to its danger and then denying that any danger exists, have been published in the papers for many months past. Quite recently the Assembly room has been vacated and the ceiling has been shored up by the use of heavy timber extending through the floor to the State Library immediately underneath. It is hard to know upon what to depend of the numerous reports that are sent out, all of which it is fair to presume have more or less of a political bias. There is no doubt but that there are certain defects in construction, and those who are interested are making the most of them. The settling of the building is claimed by the friends of the architects and building commission to be the only cause so far found for the difficulty in question. The result of the present practical investigation as to the condition of the building will be watched with much interest.

SOME work in connection with the Hotel Brighton, Coney Island, is in progress which will prove of interest, we think, to a large number of our readers. Those who have visited this summer resort within three years past have, no doubt, had their attention called to the fact that the sea has been making serious inroads upon the beach directly in front of the hotel. The severe storms of the present winter have added to the difficulty, and at present high-water mark is behind the hotel instead of in front of it. Where the music-pavilion stood, in front of the hotel, is deep water. The sea has also got under the bathing pavilion. Of course structures when close to the beach are erected on piles, and therefore the washing of the sand from under a building does not mean its instant destruction. What is in progress is the work of removing these buildings a safe distance from the sea line. The removing of a hotel 170 feet wide and 460 feet long, some parts of which are four stories high, is no small work. A novel plan has been adopted. 1200 piles have been driven into the sand under the hotel, which support 24 tracks similar to railway tracks: 250,000 feet of timber have been used in the construction of the foundation on which the tracks rest and in blocking up the big building; 1½ miles of railway track have been laid, taking the short lengths as they would measure if put into one piece. While the building is being moved it will rest on timbers laid on 125 iron trucks. The weak portions of the house have been propped up and locomotives will pull the trucks with their burden slowly and in unison. As we write the work is nearly ready for the final operation, and delay exists simply on account of the condition of the weather. When the moving begins, it is announced that invitations will be sent out, and it is probable that many people will be present to witness the operation.

AN important meeting of what is known as the Carpenters' Council met early in the month of February, in Boston. There were represented in the meeting 16 of the largest cities and towns in the Eastern section of Massachusetts. The significance of the event lay in the question under consideration—namely, that of the hours of labor to constitute a day's work. In Boston and vicinity, for the past season

nine hours per day, with eight hours on Saturday, was the established rule. In many of the outlying towns and cities no reduction from the ten-hour standard has been effected. It is the desire of the workmen to have the nine-hour day prevail in all parts of the State. To devise means for securing this end was the object of the meeting, at which 17 unions were represented. Reports from each of the delegations as to the number of hours constituting a day's work in its locality were presented, after which a long and animated discussion followed as to the method to be adopted for securing the establishment of the nine-hour day. The result of the discussion was the appointment of a committee of five to formulate a plan of procedure and to report at a future meeting.

THE number of fires that have occurred in some of the Eastern cities during the winter has been quite remarkable, and the loss incurred by them will figure up in the millions of dollars. In Pittsburgh there have been three or four disastrous conflagrations quite recently, the losses varying from $150,000 to $500,000. A few weeks since valuable buildings were destroyed in Philadelphia, entailing a loss of some hundreds of thousands of dollars, and these fires were followed by a very destructive one on Broadway, New York, in which the larger part of a block went up in flames. A million-dollar fire was also reported from Buffalo but a few days later. Besides these larger conflagrations there have been innumerable smaller fires in this and other cities which would probably show an enormous sum total of loss if all the figures could be added together. That these disasters should occur almost simultaneously is rather strange, and it would seem that the cause is in some way connected with the intensely cold weather prevailing at the time. We do not know that this matter has ever been looked into; but of course the experience of every one must have taught him that when the thermometer is very low the one idea of householders is to keep comfortable, and in doing so they are too apt to omit the usual precautions in building and keeping up fires. There are probably many buildings standing at present the flues of which are anything but perfect, but so long as the grate and furnace fires are not forced there will be no danger of the buildings catching fire. The practical test of a very hot fire is undoubtedly a very sure means of ascertaining whether the chimneys and flues in buildings are properly constructed; but, at the same time, it must be admitted that the possible destruction of the building makes it a very expensive way of deciding whether the chimney is safely built. If people would only exercise more caution in the care of domestic fires and pay some little attention to inspecting their flues the insurance companies would be declaring better dividends than they do at present. Another well-known fact that will serve in a measure to explain the disastrousness of fire in cold weather is the comparative inefficiency of the fire department. Not that the firemen are less energetic in their efforts to extinguish the flames, but the handling of their apparatus is more difficult and the water supply is too often insufficient and sometimes completely shut off as the result of a period of severe cold.

WE believe that few people realize what enormous sums of money are annually invested in building enterprises in this country. A complete list of the buildings erected during a year in every State of the Union is of course difficult if not impossible to obtain, but from the records of a few of the principal cities alone some idea can be gathered of the magnitude of the building industry. In a recent issue of the Connecticut *Real Estate Record*, a table is presented of building statistics for the past year in 25 of the large cities of the United States. A number of principal cities, such as St. Louis, Cleveland and others are unfortunately omitted, while others of a small population are included, but nevertheless some interesting deductions can be made from the statistics. The total population of the cities enumerated is about 5,500,000, and the number of new buildings erected during the past year was 50,000, costing nearly $250,000,000. Otherwise reading these figures we find the average cost of the buildings to be $5000, and the total expenditure *per capita* nearly $50. The average cost of buildings in different cities, however, varies very much. In St. Paul, for instance, the 5000 buildings erected during the year cost less than $13,000,000, or, say, $2500 apiece. In New York, on the other hand, only 4344 buildings were put up, but their total cost was over $67,000,000, which is equivalent to an average cost of more than $15,000. On first consideration this seems to be a surprising difference, but the explanation will be found in the fact that the ground of New York, which is limited in area, is pretty well covered with buildings at present, and many of the new structures which take the place of the old ones are individually very expensive, while in the West economy of space has not yet resulted in the same amount of rebuilding, and, furthermore, the rapidly increasing demand for dwelling houses has been met by the erection of numerous cheap frame structures. In the number of buildings put up during the year Brooklyn, Chicago, Kansas City, Minneapolis, New York, St. Paul and Washington, D. C., rank about the same, but the expenditure for the work varies largely. Philadelphia stands first in number of new buildings, being credited with 7696, at a cost of $25,000,000. Evidence of the prevailing industrial prosperity of the country is seen in the fact that out of the 25 cities from which the statistics are compiled only two, Chicago and Hartford, show a decrease in building operations during 1887 as compared with the preceding year.

A CORRESPONDENT of one of the English papers makes a suggestion with reference to the planning of churches which may be of interest to those of our readers who have such work in charge. He says: "Apropos of the structural defects of churches, which, I am glad to see, are attracting some attention just now, it is an astonishing thing that it has never occurred to any one to provide cloak-room accommodation at places of worship. I always feel a difficulty myself about going to church on wet Sundays, because I do not know how, when I get there, I shall dispose of my umbrella and mackintosh with comfort to myself and without annoying others. No doubt many sensitive persons feel the same. Then, again, look at the hat difficulty. Few men can afford a new hat a week, yet no man can respect himself in a hat that has once been under the seat during a whole service. And how, I ask, can an average Christian perform his devotions in an acceptable spirit with the knowledge that, as he kneels, he is putting his foot through the crown of his Lincoln and Bennett? I see that at the Church Congress the subject of 'Hindrances to Devotion' is down for discussion. but I shall be much surprised if any reverend orator gives a thought to this aspect of the question. Yet I am convinced that a cloak-room, with a civil attendant to take charge of hats, umbrellas, &c., would do much to promote true piety, and would be a greater attraction than a sensational preacher—or even 'church privileges.'"

THE PLATES.

In plate IX we show a dining-room mantel having jams in the form of molded pilasters which finish against projecting moldings around the opening and which has brackets on top supporting the shelf. The over-mantel has cupboards at the sides with transparent beveled glass front. This arrangement will be found very convenient for the display of china. The center of the over-mantel is occupied by a beveled mirror, and is fastened at the top with frieze and cornice. The engraving includes the suggestion of other decoration. This consists of a beveled dado to correspond with the design above. Such a mantel as we have presented would look well executed in mahogany, walnut or oak.

In the double Plate X and XI we show a view in hall, floor plans and details of a house built a short time since in West Eighty-second street, New York. The owner is V. Del Genovese, who is also the builder. The architect is Emanuel Gaudolfo. In the basement of the building there is located a billiard room, under the front; back of this is the kitchen, and still further back the laundry. The building is four stories in hight above the basement. One chamber floor is indicated in the plans here presented. The two floors above vary from the plan here presented, in having two bedrooms with closets where the bath is shown on the plan given herewith. The study is interesting on account of the details of the design and the neatness with which the work has been planned and executed. Oak has been used for the trimming throughout on the lower floor and ash above. On a future occasion we shall present some of the bathroom details of this building.

In Plate XII is presented a chimney corner in an English dining-room. It illustrates features of building construction and decoration that are at present very popular in many directions. The design is by an eminent English architect and represents a portion of a building in Sussex. The building in question stands upon a side hill; the outer walls are built of sandstone and have a 2-inch cavity. The inner lining is of brick.

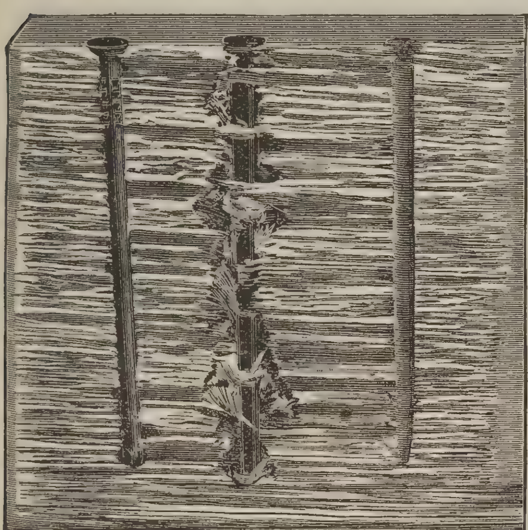
THE INDUSTRIAL SCHOOL of Tuskegee, Ala., has 400 students. The curriculum includes saw-mill work, carpentry, brick-making, &c. In Tulane University, Louisiana, there has been opened lately a similar school.

THE NASON MFG. COMPANY, 71 Beekman street, New York, are distributing a four-page illustrated circular of their manufactures. The goods include several styles of the well-known Nason radiator, steam heating specialties of various kinds, and other articles.

An Interesting Nail Test.

The very general introduction of wire nails in the place of the common cut nail lends interest to every experiment that is made having for its object a practical test of the efficiency of this style of fastening. In a recent issue of the *American Architect and Building News* particulars were presented with reference to testing coated wire nails made at the Watertown Arsenal. The nails were coated with pure refined Trinidad asphalt under what is known as the Copeland patent. In each test three kinds of nails were employed: A plain wire nail, a cut nail and a wire nail coated. Speaking on this subject our contemporary above named, to whom we are indebted for the illustrations presented herewith, says:

The cut and plain wire nails were all of standard makes. In all of these tests the nails were driven perpendicular to the grain of the wood, and but one stick of each kind of wood was used, and in all but the white oak the nails were driven to within ¼ inch of the head. In the white oak the nails were driven about 1¾ inches. All of the cut nails were driven with their tapering sides acting lengthwise the grain of the wood. In figuring the surface, no account was taken of the taper at the points of the wire nails. Four nails of each kind and size were tested in all but two or three instances, and the averages are the figures given in the table.



An Interesting Nail Test.—A Split Block of Michigan Pine, Showing the Displacement of Fibers.

The average resistance in pine per square inch of surface was 667 pounds for the coated nail, 398 pounds for the cut nail and 280 pounds for the plain wire nail. It will be noticed that the resistance per square inch does not differ very materially with the different sizes of cut and plain wire nails, but with the coated nail it is much higher in the smaller sizes. This is owing to their having much greater surface in proportion to their mass than the larger sizes and so are heated to a higher degree of temperature by driving, thus cementing them more firmly into the wood. The very slight loss from starting as compared with the other nails is accounted for in the same way: In starting the nail the cement is fractured, which generates heat and softens it, and so soon as the nail is at rest again the cement unites as before. The average loss in holding power of the nails that were started ¼ inch was 17 per cent. for the coated nail, 37 per cent. for the plain wire nail and 52 per cent. for the cut nail. If the cut nails had been driven with the taper of their sides acting across the grain of the wood they would have given a somewhat higher resistance to being started, but they would have suffered much greater loss from being started.

The average variation between the lowest and the highest result in each test was 24 per cent. for the coated nail, 29 per cent. for the plain wire nail and 33 per cent. for the cut nail. This variation was probably caused by slight inequalities in the wood, but is of value, showing to what degree the nails are affected by the varying density of the wood, even in the same stick.

To illustrate the effect of the different nails on the wood, concludes our contemporary, we print two cuts, which show very clearly the displacement of the fibers caused by driving the nail. The wood used was Michigan pine and the nails were tenpenny standard, and were driven into the edge of a plank, and the block then sawed off and split by driving in a chisel along the edge. A study of these blocks would lead one to the conclusion that a test of the nails after they had been driven some time or exposed to the action of the weather would be more favorable to the wire nail. We believe that no such test of the wire nail has ever been made, so we have no definite figures to judge from.

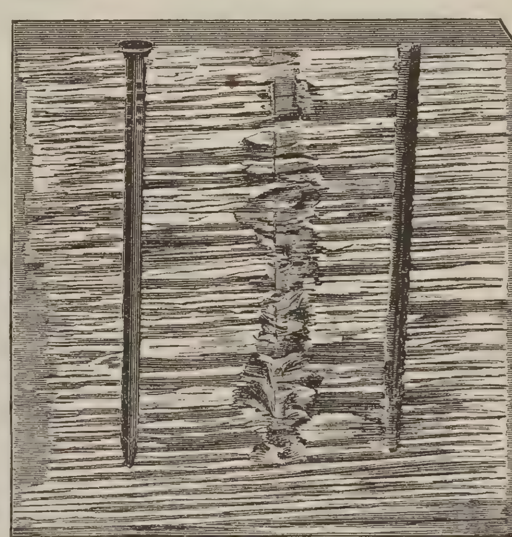
Kind of wood.	Specific gravity.	Kind of nail.	Size.	Number nails to the pound.	Pounds to pull nail out.	Pounds per square inch of surface in wood.	Pounds to pull out after being drawn ¼ inch.
W. Pine.	4418	Plain Wire..	4d	394	89	238	....
W. Pine.	4418	Cut..........	4d	252	128	278	....
W. Pine.	4418	Coated Wire.	4d	388	265	914	....
W. Pine.	4418	Plain Wire..	6d	274	142	335	....
W. Pine.	4418	Cut..........	6d	142	284	425	....
W. Pine.	4418	Coated Wire.	6d	271	312	763	....
W. Pine.	4418	Plain Wire..	8d	128	227	304	....
W. Pine.	4418	Cut..........	8d	86	581	518	....
W. Pine.	4418	Coated Wire.	8d	126	506	677	....
W. Pine.	4418	Plain Wire..	10d	88	259	258	....
W. Pine.	4418	Cut..........	10d	59	648	407	....
W. Pine.	4418	Coated Wire.	10d	87	641	638	....
W. Pine.	4418	Plain Wire..	20d	35	526	281	338
W. Pine.	4418	Cut..........	20d	31	957	405	518
W. Pine.	4418	Coated Wire.	20d	35	1181	631	1016
W. Pine.	4418	Plain Wire..	60d	13	1077	264	....
W. Pine.	4418	Cut..........	60d	10	2025	350	....
W. Pine.	4418	Coated Wire.	60d	13	1900	465	....
Spruce ..	4384	Plain Wire..	10d	88	368	366	204
Spruce ..	4384	Cut..........	10d	59	652	410	307
Spruce ..	4384	Coated Wire.	10d	87	657	654	511
W. Oak.	6255	Plain Wire..	20d	35	760	804	....
W. Oak.	6255	Cut..........	20d	31	1000	925	....
W. Oak.	6255	Coated Wire.	20d	35	999	1054	....

Results of Several Tests.

Exhaust Steam for Heating.

It is the season now, says the Boston *Journal of Commerce*, when every establishment in this climate has a use for heat, and we wish once more to call attention to the fact that the exhaust steam as it leaves the cylinder of the engine contains more than four-fifths of the heat which was put into it, which heat is just as available for heating rooms, boiling vats, and other purposes where the temperature is not required to be raised much above that of boiling water, 212° F., as heat from any other source. It is much better economy to recover this heat in making the workshop or mill comfortable, or applying it where live steam would otherwise be called for in various processes of manufacture, than to let it be dissipated in the air or go into the river in the overflow from the hot well.

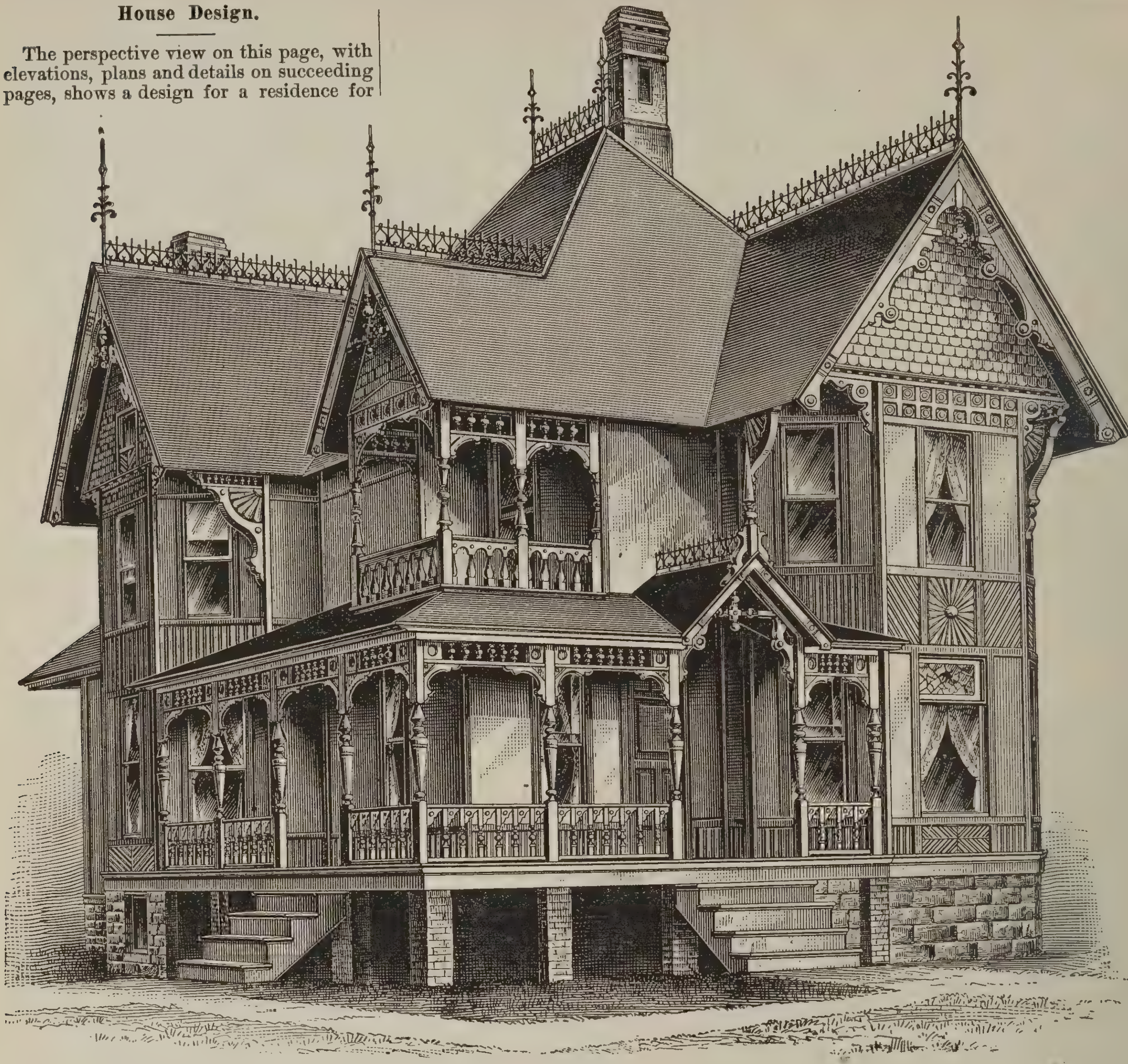
We are led to these observations in part by a visit made a few days since to a manufacturing concern in a line in which a great deal of steam is used in heating and in processes of manufacture. Steam of low pressure will suffice for all these purposes. The exhaust from a large engine was allowed in great part to escape into the atmosphere, and the boilers were being drawn upon for live steam for the radiators, vats and pits. They had not boiler-power enough, notwithstanding a recent large addition to their boiler plant; yet a suggestion that all the steam piping for heating and manufacturing purposes should be conducted into one well-drained low pressure system, into which the engine should be allowed to exhaust, provided with a back-pressure valve to relieve the pressure, in case the engine should furnish too much steam, and connected through a reducing valve with the live steam system to maintain the pressure in case the calls upon the system were more than the exhaust of the engine could supply, was treated as a gilt-edged idea which would do first rate for a fine plant, but which it would not pay them to go into. Yet it could all have been accomplished by the laying of a few feet of extra pipe, the addition of a few traps and a reducing valve. It would have provided for the entire use of the exhaust, if it was needed, and prevented any call upon the boilers for live steam until the supply of exhaust proved too small, and then only enough to supply the deficit. A recommendation for an expensive change in setting might have met with more favor.



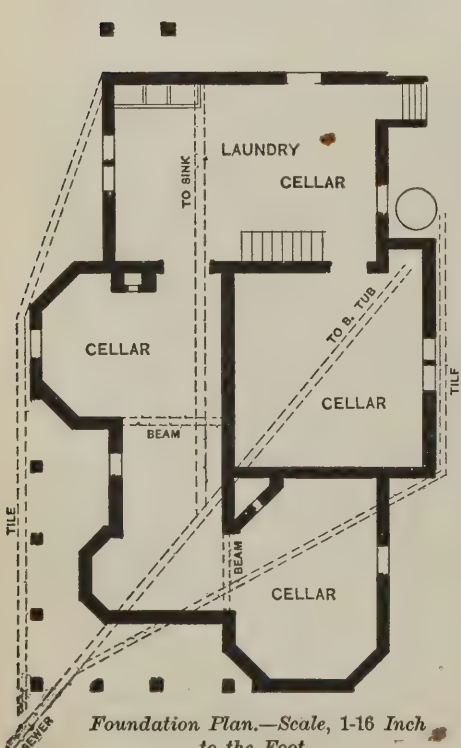
A Similar Experiment with the Nails Withdrawn.

House Design.

The perspective view on this page, with elevations, plans and details on succeeding pages, shows a design for a residence for



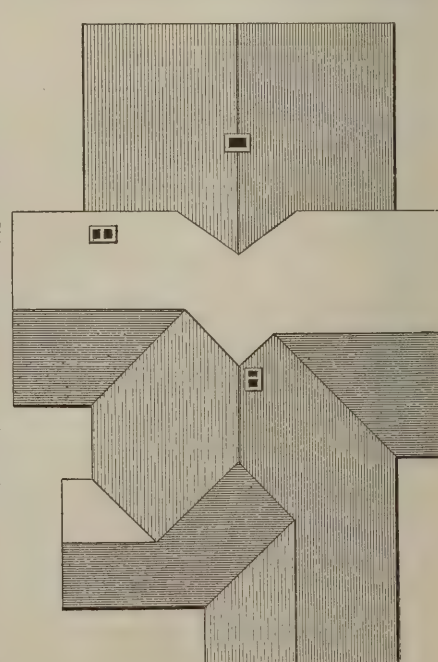
Perspective View of Residence of Charles E. Bradt, De Kalb, Ill. George F. Barber, De Kalb, Ill., Architect.



Foundation Plan.—Scale, 1-16 Inch to the Foot.

Charles E. Bradt, built at De Kalb, Ill., a few months since, the design being by George F. Barber, architect, of that place. The cost of the building at the time is stated to have been about $3500. In the estimation of the architect the house could be built for a smaller sum at the present time. The cellar extends under the entire house, and the wall above the grade line is 2 feet 6 inches high, laid up with coursing stone, with raised pointing in red mortar. The house is sheeted with fence flooring, over which resin-sized paper is placed and over this the finishing material. The shingle finish in the gable is done with California redwood shingles dipped in oil. After the shingles were in place we learn that a coat of Crockett's Spar composition was applied, which has answered a satisfactory purpose in preserving the beauty and deep coloring of the wood. The roof of the house is painted red. The parlor is finished in antique oak, with a mantel of rather elaborate design in the same wood. The hall door is of solid oak and the interior of the hall is of oak, including the stairway. A portion of the details is presented at this time, and the remainder will be given in a future number of the paper.

Carving machines, each of them capable of doing the work of eight to ten men, have been introduced into the Pullman car shops, in Illinois, and, as claimed, with success. The machines work from a pattern, previously made by hand, which is placed in the center. A "needle" is made to follow all the curves, &c., of the pattern and chisels on the end of arms at each side make duplicates of the pattern. These



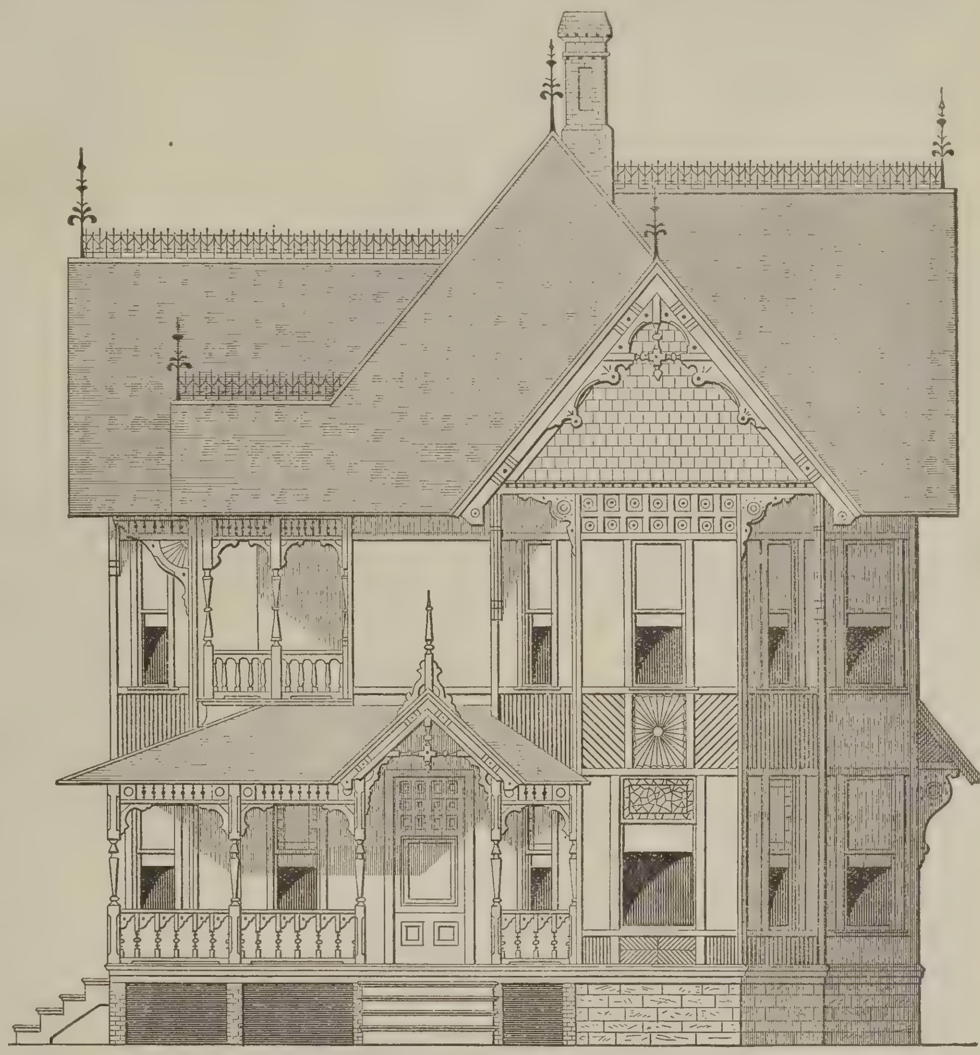
Roof Plan.—Scale, 1-16 Inch to the Foot.

machines will largely supersede hand work, and at the same time insure uniformity.

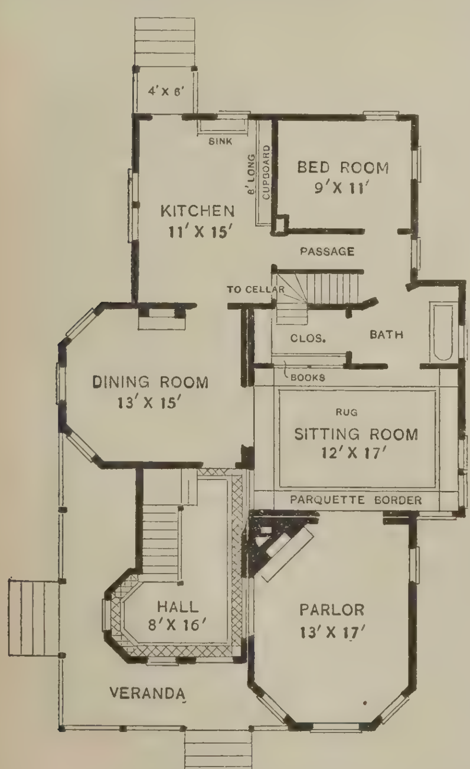
Architecture and Draftsmanship.

It is scarcely necessary to remind our readers that in many sections of this country in particular draftsmen who are able to portray building construction with some degree of skill and have the ability to design a pleasing exterior for a house are very commonly called architects. Turning the assertion about, many of our readers will bear us out in saying that many who claim to be architects have no other qualifications for the position than their skill as draftsmen. W. Hoskins, writing on this subject in one of our English exchanges, says:

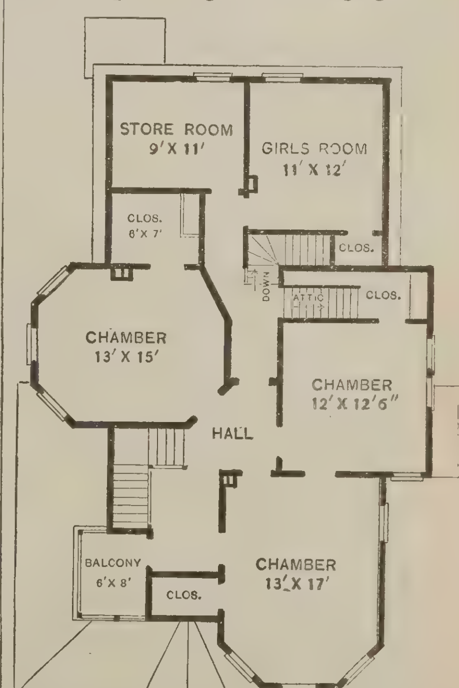
Architecture and architects suffer together, from their association in the public mind with the imitative arts, and with mere artists; the practice of architecture is thought to consist in making drawings, and the architect to be at best but a drawer of plans! Hence the responsible duties that devolve upon the architect are quite lost sight of; the careful study required to fulfill the conditions necessary to building well—the labor of prearranging and specifying everything for useful service, and as to labor and materials, their proportion, composition and combination, in detail, so that the cost of execution may be minutely estimated beforehand—the anxious care in supervising, that the work be properly executed, preparing and supplying in the meanwhile perfect delineations of the constructions and decorations in detail, and the eventual investigation of accounts—all these things are unknown, overlooked, or unheeded, and the architect is considered as an overpaid artist—artists being linked in the same category with players, fiddlers and dancers. But why, it may be asked, is this so? Why are men who must have extensive scientific and artistic qualifications, who must, moreover, be good men of business, when they are properly qualified to practice as architects, and who must, withal, be in a certain condition of life to be trusted with directing the expenditure of large sums of money—why is it that this class of men is so lightly esteemed? I have already said that it is in a great measure because architects have sunk into mere artists; as such they are considered, and they submit thereupon to be treated in a manner that would be resented as insulting by any well-regulated profession. An architectural design is looked upon as an artist's sketch, a work of naught, and every man, how ignorant soever, deems himself competent to judge of its merits, and the unworthy practice of architects is to submit to have their productions so considered and so adjudged.



Charles E. Bradt's Residence.—Front Elevation.—Scale, ⅛ Inch to the Foot.



First Floor Plan.—Scale, 1-16 Inch to Foot.



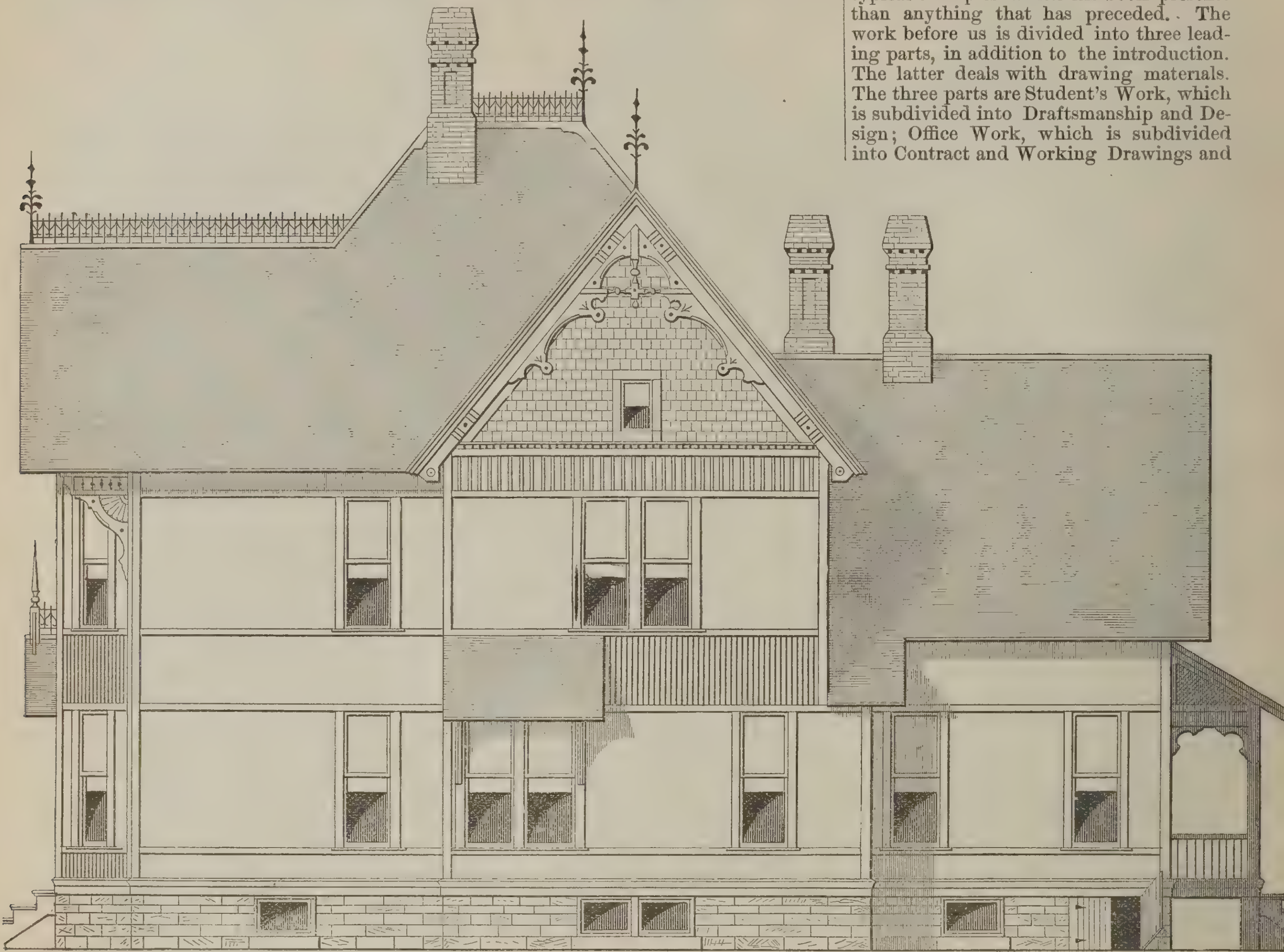
Second Floor Plan.—Scale, 1-16 Inch to Foot.

NEW PUBLICATIONS.

A Text Book on Roofs and Bridges—Part I—Stresses in Simple Trusses, by Mansfield Merriman. Size 6⅛ x 9½ inches, 118 pages. Published by John Wiley & Sons. 1888.

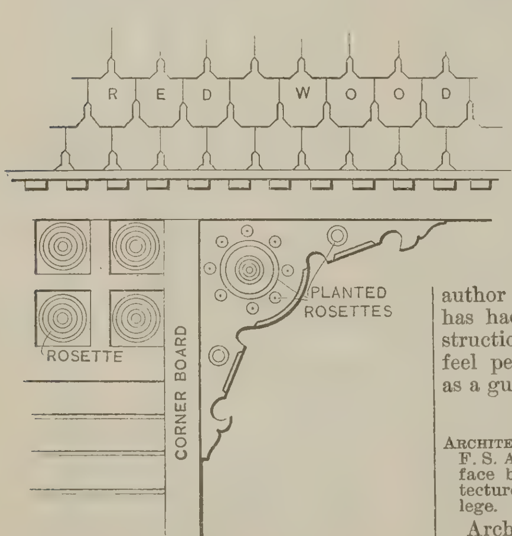
The author of this work is professor of civil engineering in the Lehigh University, and is already well and favorably known as an authoritative writer on applied mechanics. The course of instruction in roofs and bridges followed by students of civil engineering at Lehigh University consists of the computation of stresses in roof trusses and the common style of simple bridge trusses; the graphical method of analyzing stresses; the designing of a bridge, including the proportioning of details and preparation of working drawings and finally the discussion of cantilever, suspension, continuous and arch bridges. In the work under review Professor Merriman has written a text-book covering the first part of this course. Although no mention is made of the fact, we presume that it will be followed by other works designed to meet the requirements of the students as they advance in the course. It is remarked in the preface that the plan adopted in arranging this text-book on the computation of stresses is similar to that followed in the author's "Mechanics of Materials," the principles

and methods being first established, and then numerical examples being fully worked out to illustrate them and their application, while a number of problems are given in addition as exercises for the



Charles E. Bradt's Residence.—Side Elevation, Right.—Scale, 1/8 Inch to the Foot.

student. A very excellent feature of this text-book which we noticed on first taking it up was the interleaving with blank pages, the author stating that this has been done so that the student could preserve the solutions

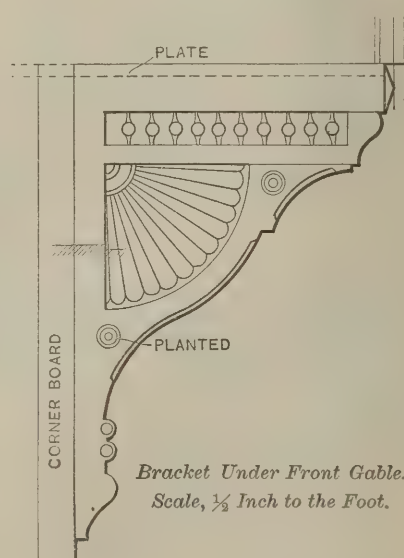


Detail of Front Gable.—Scale, 1/2 In. to Foot.

of the several problems distributed through the book, it being justly observed that no work is so valuable to a student as that done by himself. The very fact that the student is able to refer to problems which he has worked out himself will recall the minor explanations and details in a way that no printed solutions could. The work is divided into three chapters, the first, "Stresses in Roof Trusses," covering some 300 pages, and including all the instruction and information that is necessary for a student in this particular branch of mathematics. Chapter two, "Highway Bridge Trusses," covering about the same space, while the remainder of the book is devoted to "Railroad Bridge Trusses." Though this book is spoken of as a text-book, it must not be assumed that the subject is presented in a simple and easily comprehensible form to those who are unacquainted with mathematical work. To those who are familiar with such methods, the work will be found a most valuable text-book. The author ranks so high in his profession, and has had such extensive experience in instruction, that the reader or student may feel perfectly safe in taking his text-book as a guide.

ARCHITECTURAL DRAWING. By R. Phene Spiers, F. S. A., Architect. American edition, with preface by William R. Ware, Professor of Architecture in the School of Mines, Columbia College. Published by Cassell & Co,. Limited.

Architectural students in America will, no doubt, appreciate an American edition of one of the most valuable works on architectural drawing which has come to our knowledge. The skill and experience in architectural drawing of Mr. Spiers, both as a draftsman and teacher, have been known in America for some time, and accordingly a work that bears his name will scarcely need introduction to those who have given this subject any attention. The present work, however, is calculated to lead a larger public to study what he says and to examine the typical examples which his book presents than anything that has preceded. The work before us is divided into three leading parts, in addition to the introduction. The latter deals with drawing materials. The three parts are Student's Work, which is subdivided into Draftsmanship and Design; Office Work, which is subdivided into Contract and Working Drawings and Competition Drawings, and the third part Outdoor Work. In addition to the table of contents, there is at the close of the volume an index to paragraphs, and a glance at some of the heads under which these



Bracket Under Front Gable. Scale, 1/8 Inch to the Foot.

are classified will serve to show the reader the excellent arrangement of the work and the comprehensiveness of the volume. Prominent in the classes of paragraphs are Materials, Elementary Train-

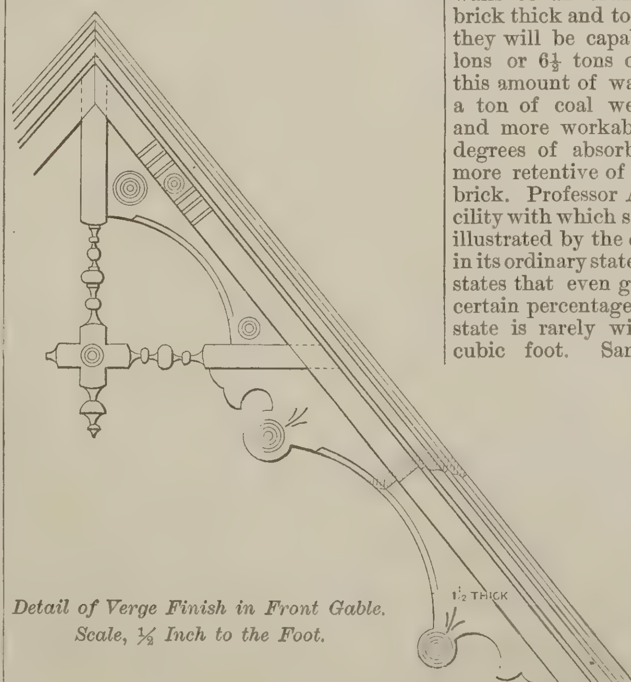
ing, Free Hand Drawing from the Round, Geometrical Drawing in Outline and Geometrical Drawing Tinted and Shaded. Then follows a chapter on Perspective Drawing. Design is next considered, the first division being Copying of the Orders, after which is Study of Design, and then follow in order Working Drawings, Reproduction of Working Drawings, Competition Drawings, Outdoor Work, Measured Drawings, Perspective Drawings, Water-Color Drawings, Color Decoration, &c. The work contains 25 full page plates, several of which are in colors. There are also some wood cuts in the text serving to illustrate it. The book is a small quarto containing altogether somewhat less than 100 pages of text. It is carefully arranged; it is comprehensive and cannot fail to be of great assistance to every student. The plates are selected from the work of well-known architects, thus lending a special attractiveness to the book. Examples are presented of what men have done in the prosecution of their profession, which certainly is an advantage to the reader as compared with designs constructed simply for the purpose of illustrating the text.

The restoration of some of the most important stone structures in Paris, such as the colonnade of the Louvre, of the Pont Neuf, and of the Conservatoire des Arts et Métiers, has been mainly accomplished by means of a metallic cement invented by Professor Brune. It consists of a powder and a liquid, the first composed of 2 parts by weight of oxide of zinc, 2 of crushed limestone and 1 of crushed grit, the whole intimately mixed and ground, ocher in suitable proportions being added as a coloring matter; the liquid employed consists of a saturated solution of zinc in commercial hydrochloric acid, to which is added a part, by weight, of hydrochlorate of ammonia, equal to one-sixth that of the dissolved zinc, and this liquid is diluted with two-thirds of its bulk of water. One pound of powder is mixed with 2½ pints of liquid.

Charles E. Bradt's Residence.—Side Elevation, Left.—Scale, ⅛ Inch to the Foot.

Dampness in Walls.

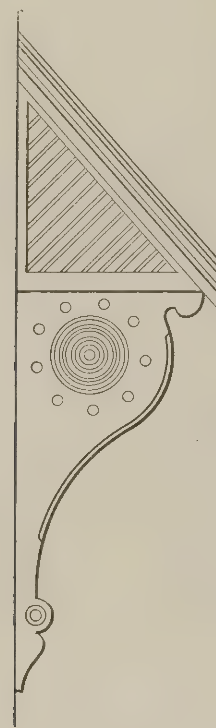
In discussing the question of the amount of water which walls of different construction will absorb and hold, E. Chadwick advances the proposition that all interior cottage walls should be made washable.



Detail of Verge Finish in Front Gable. Scale, ½ Inch to the Foot.

Besides the evil arising from absorbency of the animalized gases of walls of the common construction there is another great source of evil attaching to walls of the common soft stone construction—the absorbency and retentiveness of water or damp. In England the common bricks absorb as much as a pint or a pound of water. Supposing the external walls of an ordinary cottage to be one brick thick and to consist of 12,000 bricks, they will be capable of holding 1500 gallons or 6¼ tons of water. To evaporate this amount of water would require nearly a ton of coal well applied. The softer and more workable stones are of various degrees of absorbency and appear to be more retentive of moisture than common brick. Professor Ansted states that the facility with which sandstone absorbs water is illustrated by the quantity it contains, both in its ordinary state and when saturated. He states that even granite always contains a certain percentage of water, and in the dry state is rarely without 1½ pints in every cubic foot. Sandstone, however, even that deemed fit for building purposes, may contain ½ gallon per cubic foot, and loose sands at least 2 gallons. When water presents itself in any part of such material it readily diffuses itself by the power of capillary attraction, by which, it is observed on some walls in Paris, it ascends 32 feet from the foundations. Walls of such absorbent constructions are subject to rising wet by capillary attraction, as well as to the driving wet

of rain or storm. To guard against the driving wet on the coast expensive external coverings of slate are used. But these do not stay the rising wet. This wet, having to be evaporated, lowers temperature. Damp walls or houses cause rheumatism, lower strength, and expose the system to other passing causes of disease. In London it is admitted that houses, even of the



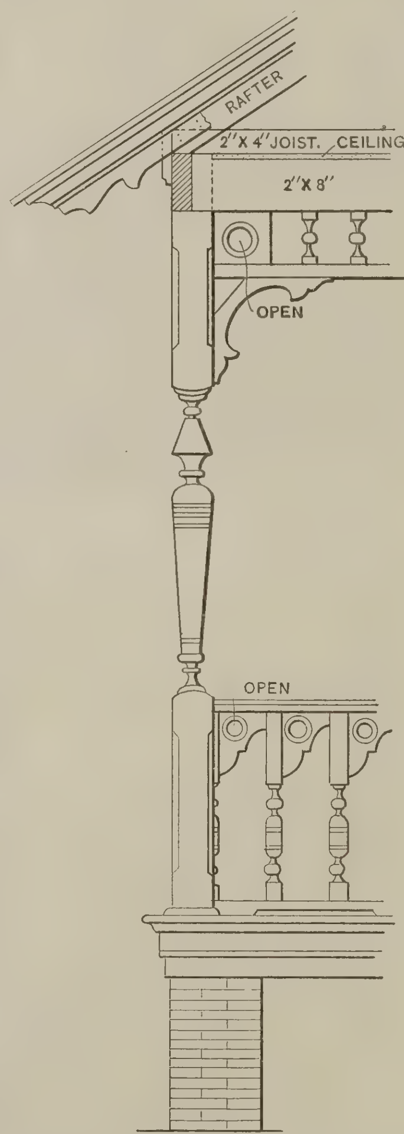
Charles E. Bradt's Residence.—Bracket to Hood on Right Side.—Scale, ½ In. to Foot.

better class, cannot safely be inhabited in less than nine months. Indeed, registrars of deaths are aware that an extra death-rate is, after all, usually attendant on their first occupation. The majority of bent figures in onr villages are due to the infliction of rheumatism from damp. In Paris, notwithstanding its peculiarly dry subsoil and its dryer climate, the sanitary, or insanitary, evils of the common architects' constructions appear to be even greater than in London. I was assured by a Parisian builder of considerable experience that it was unsafe to occupy any new house in Paris in less than a year after its construction, and that there were houses in Paris which would never be dry "in their lives," and would always afflict their occupants.

Every one, says the *American Architect*, has seen some of the wide planks of redwood which occasionally appear in the Eastern markets, but few persons outside of California know the gigantic dimensions in which redwood lumber may easily be obtained from mills which possess machinery capable of sawing it. We remember seeing once a solid redwood plank 5 feet wide, which was the admiration of the building portion of the town for a time; but, according to the California *Architect*, this was small compared with some to be had in the vicinity of the redwood forests. Not long ago the managers of a State fair in California sent circulars to the saw-mills, inviting exhibits of redwood planks. In response to this a certain mill sent a "good-sized" plank, which measured 6 feet in width. Hearing of this, the proprietors of another mill worked up some planks 80 inches wide, and sent samples for exhibition; and soon afterward a third establishment, the McKay mill, forwarded a lot of perfectly clear, sound planks and boards, varying in width from 10 to 11 feet. If there were any special demand for such enormous pieces of this unrivaled timber, they would be more frequently seen, but the wood construction of the world has for a thousand years been based on the assumption that sawed sticks measuring more than 12 inches in breadth or depth of section would be costly, and difficult to obtain; and a new system must be made to suit the materials of the Pacific Coast, or the redwood logs will continue to be subdivided into pieces approaching in size the Eastern lumber.

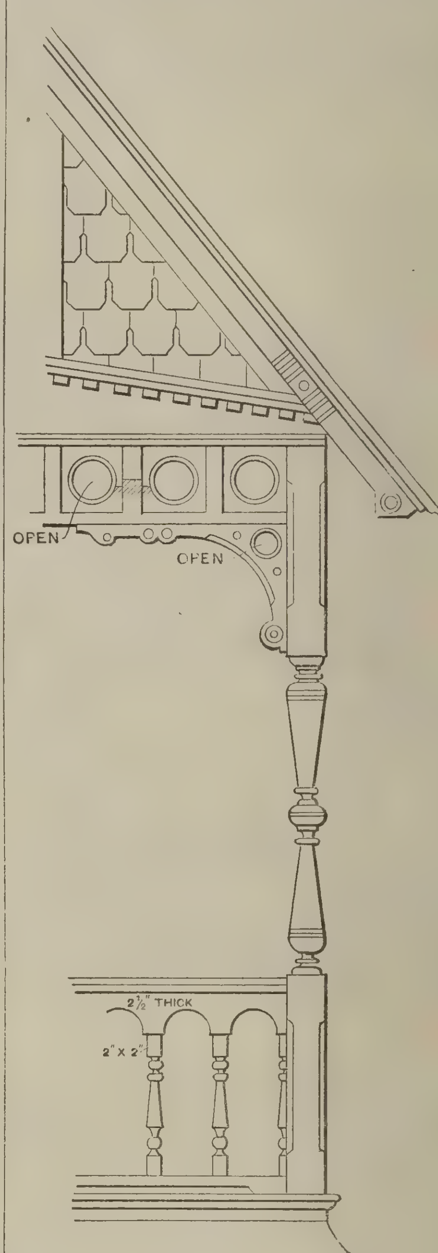
Mortar.

Lime or cement paste, says C. H. Haswell, is the cementing substance in mortar, and its proportion should be determined by the rule that the volume of the cementing substance should be somewhat in excess of the volume of voids or spaces in the sand or coarse material to be united, the excess being added to meet imperfect manipulation of the mass. Hydraulic mortar, if re-pulverized and formed into a paste after having once set, immediately loses a great portion of its hydraulicity, and descends to the level of the moder-



Detail of Front Piazza.—Scale, ½ In. to Foot.

ate hydraulic limes. A great destruction of the hydraulic principle, therefore, results from any disturbance of the molecular arrangement of the mortar after crystallization has commenced. This is what occurs with the intermediate limes, which take initial set promptly and firmly, but which are subsequently thrown down by the slaking of the impure caustic lime which they contain. All mortars are much improved by being worked or manipulated, and as rich limes gain somewhat by exposure to the air, it is advisable to work mortar in large quantities, and then render it fit for use by a second manipulation. White lime will take a larger pro-



Details of Balcony.—Scale, ½ Inch to Foot.

portion of sand than brown lime. The use of salt water in the composition of mortar injures the adhesion of it. When a small quantity of water is mixed with slaked lime a stiff paste is made, which upon becoming dry or hard has but very little tenacity; but, by being mixed with sand or like substances, it acquires the properties of a cement or mortar. The proportion of sand that can be incorporated with mortar depends partly upon the degree of fineness of the sand itself, and partly upon the character of the lime. For the rich limes the resistance is increased if the sand be in proportions varying from 50 to 240 per centum of the paste in volume; beyond this proportion the resistance decreases. Stone mortar—325 pounds cement, 120 lime and 14.67 cubic feet of sand. Brick mortar—326 pounds cement, 120 pounds lime and 12 cubic feet of sand. Brown mortar—Lime one part, sand two and a small quantity of hair. Lime and sand, and cement and sand, lessen about one-third in volume when mixed together.

CORRESPONDENCE.

An Inventor's Rights.

From J. J., *Wilmington, Del.*—I have invented a machine for a certain purpose in the manufacture of which three other persons are to furnish the capital. By agreement I am to have 30 per cent. of the profits. The design is to form a stock company. I wish to ask how I can keep control of my invention on such a basis.

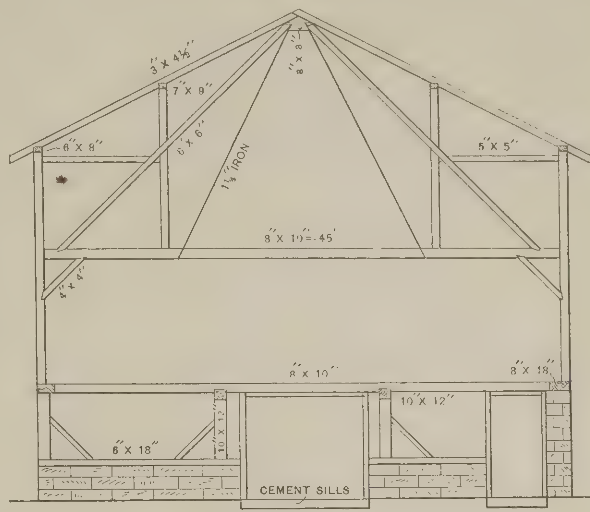
Answer.—Our correspondent's question is one that frequently arises in the experience of an inventor when he comes to negotiate with capital for the development and introduction of his invention. Several different plans are pursued in such cases, and which of them is best to be employed depends very much upon circumstances and the willingness of the capitalistic partners to agree to them. At the outset our correspondent has the choice of two general schemes. One would be to sell his machine or invention outright to the company, taking stock or money, as the case may be, for it. By this plan he parts with the title to it and has no further control of it, save that influence or voice that can be had by reason of his ownership of a fractional part of the company's capital stock. The other plan is to retain the ownership of the patent, and to simply transfer to the company the right to use and manufacture. The title to the invention in this case remains with the inventor, and he receives from the company either a portion of their capital stock in lieu of royalties during the life of the patent, or else he receives royalties payable year by year. As far as we understand the condition under which our correspondent is working, one or the other of these plans is about all that is available for him. Some modifications of these are possible, but we presume that what we have last outlined would meet the case, provided the moneyed men of the corporation are agreeable thereto.

Setting Furnaces.

From J. W. M., *Easton, Pa.*—In the correspondence on the setting of hot-air furnaces a very important point has been omitted. It is impossible to formulate rules applicable to all cases. Nearly every case needs treatment by itself. The direction and force of the wind must be taken into account, and the position of the house to be heated relatively to the surrounding objects. The same conditions do not obtain in the city and the country, on the hill top and in the valley. Our buildings are situated on a hill 150 feet high. They stand each by itself. Experience has taught us to place our furnaces as close to the wind as possible. The prevailing winds are from the west and northwest. There is, therefore, no difficulty to get the heated air to go through comparatively long pipes toward the east, but very great trouble to move it in the opposite direction. Hence we shorten the west and northwest pipes by placing the furnace near the west wall. The statement that the cold-air box should open on the west or north side is evidently not true for our situation. That was the practice until knowledge was acquired at considerable expense. With the temperature at zero or below and the wind blowing a gale into the box, failure to heat the house is sure to result. If the box is opened wide enough to admit a sufficient quantity of air by its mere velocity it rushes past the furnace without heating. If not opened wide enough it fails to come at all. The only resource left is to take the air from the cellar. This should be avoided. The solution of the question for such situations is to take the cold air from the south side of the house.

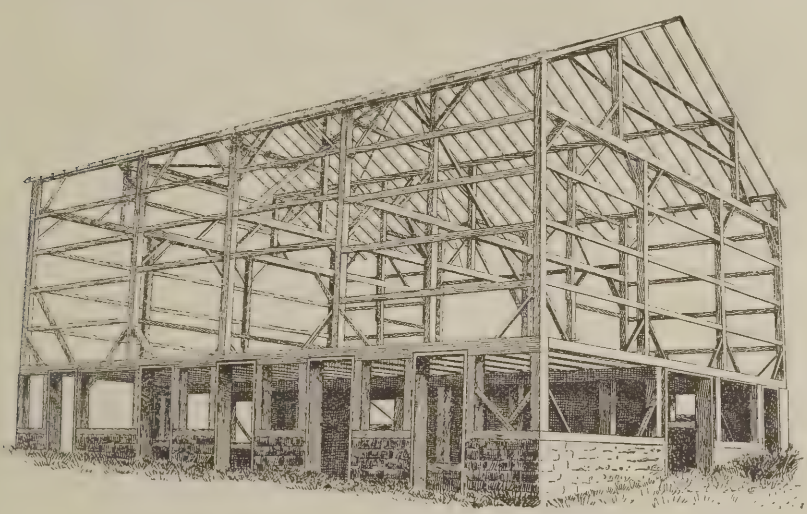
Barn Framing.

From W. A. L., *Platea, Pa.*—I inclose you a photograph of a barn frame which I have recently put up with the assistance of two other men. We did the work in less than 40 days. The frame was raised in 2½ days by five men and one horse. I also inclose a drawing of the middle bent; this will show how the barn can be made clear from end to end. It is suggested for the benefit of those who desire to use hay carriers, and also to show that it is not necessary to use large timbers. I also inclose a floor plan which will serve to make the photograph more intelligible to your readers.



Cross Section.

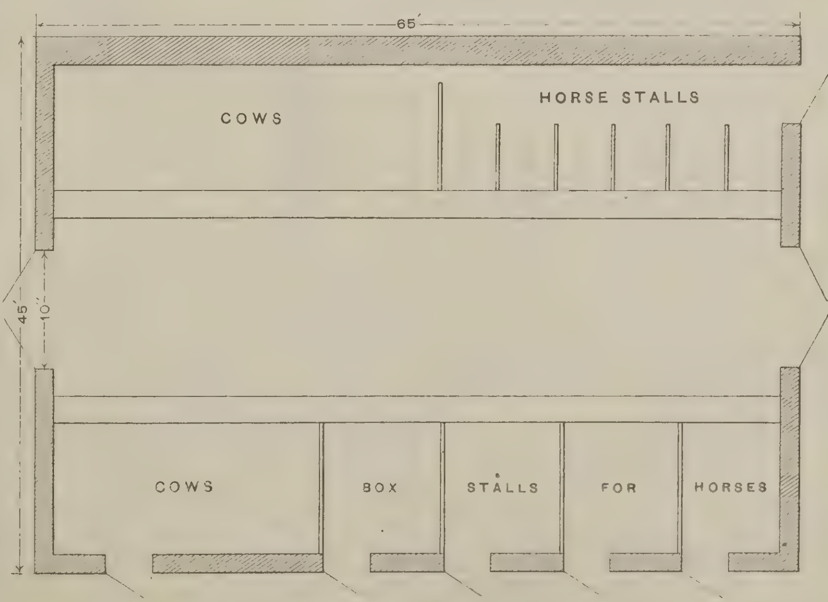
Note.—The perspective view of the framing, presented herewith, has been drawn from the photograph which our correspondent sent us. We have also engraved the elevation of the middle bent, to which reference is made, and likewise the floor plan. We think all of this matter is of interest to our readers.



Barn Framing.—Engraved from Photograph Furnished by W. A. L.

Barn Designs.

From E. P., *Hanover, Mich.*—I think it would interest the readers of *Carpentry and Building* if a little more attention were given to the architecture of farm buildings, including farmhouses and barns. There is great room for improvement in this direction, combining with the practical knowledge of farming some conception of architecture. Some years ago I superintended the building of a barn costing about $15,000, for a city farmer. The building, of course, was designed by a city architect.



Floor Plan.—Basement.

It had spires and turrets, domes and gables until the builder could scarcely rest. It was a handsome structure from the standpoint of the designer, but, unfortunately for the farmer, every load of hay and grain had to be taken in from the outside, through a very small door in one of the gables in the second story and carried, a fork full at a time, through a long hallway and around a corner to be stored. In other respects the general arrangement was about as handy as this item indicates. We want more practical barns and less fanciful buildings.

Preservative Qualities of Black Paint.

From J. H. M., *Brooklyn, N. Y.*—Have you or any of the readers of *Carpentry and Building* noticed the apparent lasting and preservative qualities of black paint? I have noticed in the course of my life many old business signs originally painted white with black lettering; also wooden grave marks, black lettered, where age had tried the wood even to partial decay, carrying away every vestige of white paint, while the black painted portions remained comparatively perfect. The black paint preserved the wood beneath it. The lasting and preservative qualities of black paint are no doubt due to the pure carbon of lampblack. Notwithstanding the advantages of black paint, we could scarcely paint our houses black, for that would be an outward sign of woe, besides being in very bad taste; and yet it occurs to me that a considerable mixture of lampblack, if desirable, might be used in making light and dark lead colors and as a ground for other colors. What do the readers think of this suggestion?

Wheel Problem.

From J. F. M., *Paterson, N. J.*—I would like to offer the following solution to the problem proposed by "W. C. T.," in your January issue. In the first place, tilting a wheel puts it under the same conditions as a rolling cone. We find the point on the plane where a line drawn through the axis of the wheel intersects the plane as follows, referring to the accompanying sketch: As $\frac{1}{2}$ is to 24 inches, so is 24 inches to the distance between S and A, or 1152 inches, which is one-half of the diameter of the circle on which the wheel would revolve, and the circumference is therefore 1152 times 2 times 3.14, equals 7235.56 inches. The circumference of a 48-inch wheel is 48 times 3.14, equals 150.72 inches. Divide the circumference of the circle by the circumference of the wheel and the result is the number of revolutions the wheel will make before returning to its starting point. 7234 divided by 150.72 equals 48 revolutions.

Note.—Accompanying our correspondent's solution was a neat sketch showing a tilted wheel with the several lines drawn through it as referred to in his explanation. The solution, however, is so nearly akin to the one given above, by "E. C. S." in our February issue that we thought it unnecessary to reproduce his drawing. As the letters, however, do not agree in the two cases, we took the liberty of changing the lettering he had put in his communication. The method of solution, however, was not altered in any way.

Conveying Sawdust.

From J. L. W., *Fayetteville, Tenn.*—I wish to ask the readers of *Carpentry and Building* the cheapest and best plan for conveying sawdust from a sawmill where there is too little room to get a wheelbarrow into use. The mill in question is placed between the planing-mill and another building. On the side the sawdust should be taken out we cannot get to it. It will have to be taken out under the building and carried some 30 feet from the saw. If any of the readers have suggestions to make I should be glad to hear them.

Livery and Boarding Stable.

From Charles E. Hebberd, 62 *Broad street, New York.*—I submit for the consideration of the readers of *Carpentry and Building*, elevation, section and floor plans of a livery and boarding stable. The drawings represent a building recently erected in Brooklyn on a lot 25 x 150 feet. In various respects it exemplifies the conditions controlling a building of its kind in a crowded city. The same general arrangement could be obtained from an ordinary city lot 25 x 100 feet, but in this case, of course, the number of stalls for horses would necessarily be reduced. The first floor is arranged for office, toilet room and standing accommodations for carriages. There is no cellar under the building. The floor of the first story, with the exception of the office, is designed to be of artificial stone or concrete. A galvanized-iron boiler in the closet is connected with a fireplace heater, furnishing hot water for the harness-room. The second floor is furnished with accommodations for 26 horses, there being 22 common stalls and 4 box stalls. The upper floor is devoted to general storage and feed-rooms. The side windows are shown at a sufficient distance back from the front to insure them from being closed up by adjoining building. Without these side windows sufficient light is obtained from front and rear and a skylight in the ceiling to answer all satisfactory purposes. The building is designed to be of brick and stone, with terra-cotta trimmings, and the estimated cost is in the neighborhood of $10,000.

Design for Livery and Boarding Stable. By Charles E. Hebberd. Scale, 1/8 Inch to the Foot.

Gelatine Molds.

From A. D., *Lathrop, Mo.*—Will you please publish a receipt for making gelatine molds in which to cast plaster of paris ornaments?

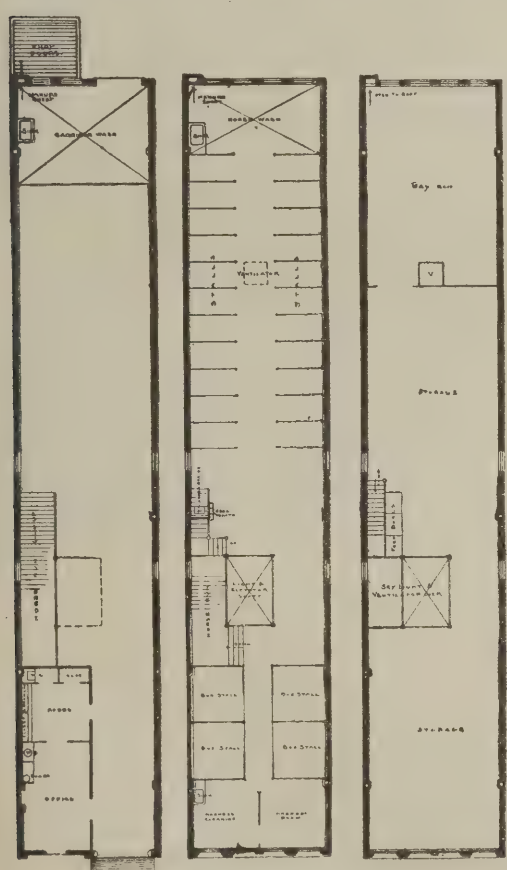
Answer.—A common way of preparing such molds is simply to take the white glue of commerce, soak it in cold water until it has swelled fully, then pour off the cold water and add enough hot water to dissolve it. The liquid mass is then ready for pouring into the mold form and will stiffen on drying. Of course it is necessary to

grease or otherwise protect the figure over which the mass is poured. In one technical receipt-book we find the following description of the method of making elastic molds for galvano-plastic copies in very high relief. The receipt reads as follows: "Take twenty parts of glue and two parts of brown rock candy and dissolve both in sufficient hot water to form, on cooling, a very stiff jelly." We presume that this receipt is intended for flexible molds which have to be used in the case of under-cutting on the ornaments. If any of our readers are familiar with the making of gelatine molds and know of better receipts than we have offered, we should be very glad if they would communicate with us so that we could publish the information.

Paint for Galvanized-Iron Work.

From W. L. S., *Carrollton, Ky.*—I desire to inquire through *Carpentry and Building* what is the best kind of paint to be used on galvanized-iron work. The paint in this part of the country peels off from the work, and our painters very generally claim that it is hard to get any kind of paint to stick well to galvanized iron. One of the objections raised to galvanized-iron cornices in this part of the country is the fact of the paint behaving as it does.

Note.—We believe it is the general custom, in this part of the country, at least, to prime galvanized-iron cornices with paint composed of oxide of iron and oil. This paint, which is very largely used upon iron in general, does not show as much disposition to peel off as lead paints, or the patent paints which are frequently employed. This said, however, we are not satisfied that oxide of iron is the best paint for use under all circumstances, and we would be glad, accordingly, to have our subscribers discuss this question, bringing forward the result of experience.



Floor Plans of Livery Stable.—Scale, 1-16 *In. to Foot.*

Table of Diagonals.

From W. H. N., *Bristol, Conn.*—I have often thought that a table or column of diagonals published in *Carpentry and Building* would be a good thing, provided it was properly constructed. I will present my idea of what it should be, and perhaps some correspondent will act upon the suggestion. The dimensions should be in feet, inches and parts of inches—that is, in inches with one-fourths, one-eighths and three-thirty-seconds. I would have the dimensions diagramically presented, giving the distance on the square line and the distance on the angle line. This perhaps would entitle it to the name of "brace rule" or "rafter rule"; it would be useful for either purpose. Both hip and rafters for roofs of varying pitches from 2 to 12 inches to the foot, and of different runs and rises, could be obtained from it. It would, I think, be a handy table for many persons. All the books that I have examined give such dimensions in feet and fractional parts of a foot decimally expressed, which makes it difficult to use the table in practical work.

A Concise and Easy Method of Estimating.

From B. S. Hoxie, *Evansville, Wis.*—May I help your correspondent, "W. H. G.," with reference to a concise and easy method of estimating? He says he is entering upon the plane of active life for himself. So are hundreds of others. Some of this number will be successful, while others will fail. Every good mechanic knows that other qualifications are necessary to success in addition to his mechanical ability. First, there must be the habit of thought and study, combined with correct apprehension. The successful man must not only know how to do a thing, but the best way to do it. Right here let me say that no young man can learn his trade perfectly under a single master. Some variety in instruction as well as variety in work is essential to the highest proficiency. Doing a piece of skilled work one day, a gentleman asked me where I had learned my trade. My answer was that I had never learned it, and never expected to—in other words, I am still learning. I will suppose that a young carpenter is at work for himself, or for the master mechanic, employed in the ordinary work of his town or village. Under these circumstances, let him make a careful memorandum of the work and material used in every building upon which he is engaged. For example, in the case of an ordinary dwelling-house, let him note the size, style of finish, how many days it took to put up the frame, how many days to inclose it, how much time was devoted to making the window-frames, how much time was used for putting on the siding, making the cornice-work and doing the shingling, and so on, with all the other different items. Let him note the class of labor employed, whether all skilled mechanics were used, or were many of the workmen common hands. Let him note also the cost of materials; were nails worth $2.50 or $3.50 a keg? did common lumber cost $16 or $20 per foot? Such a memorandum book, carefully and systematically kept, will be of special advantage in the direction of a basis for correct estimates in future work. It will serve also to educate and mature the judgment of the young mechanic who keeps the book. I have seen two men work several hours to put up a scaffold, which should have been completed in one-half of the time. Again, some men, on account of the lack of skill in judgment, will waste in material nearly or quite enough to pay their wages. They do not know how to avoid a defect or to cover one when it is made. For the want of skill, or the proper use of a measuring-rod, and a system in fitting and hanging doors, some men will be twice as long in accomplishing the work as others. I might go on with illustrations of the same character indefinitely, all showing how well-directed efforts in labor may be a success, and yet how a good workman may fail for want of it. All cannot be overseers of work. A good overseer must see that every workman fully understands the task assigned to him, and he must know that every man is working to advantage. I trust these hints will be of some benefit to the young mechanic who made the inquiry, to which this a reply.

Inside Sheathing.

From R. G. M., *Atchison, Kan.*—In the August number of *Carpentry and Building* there was a question from "S. F. B.," of Wellington, Ohio, with reference to inside sheathing. I will attempt to give your correspondent a few points on balloon frames having reference to the special construction about which he inquires. With balloon frames inside sheathing is very desirable, from the fact that it makes a more solid wall, and makes it possible to drive a nail almost anywhere through the finish without the necessity of hunting for a studding. About half the houses built in this place are constructed with inside sheathing. Where a house is to be shingled on the outside, and other ornaments are to be put on, it is necessary to sheet it on the outside; therefore some houses in this vicinity are sheathed both inside and outside, and are finished with building paper in addition. A case in point is the addition to the residence of Senator Ingalls, of this place. In this building mineral wool is being used between the studding and the joists.

From F. C. Q.—I quite agree with "S. F. B." in the matter of house sheathing. I do not think there is anything right about inside sheathing. I contend that inside sheathing does not make as warm a house as outside sheathing, for this reason: There is usually spring enough to the siding to let in cold air between it and the sheathing; this keeps the walls cold all the time. On the other hand, when the sheathing is on the outside there cannot possibly be any spring to the siding. When the siding is painted the paint will soak the joints of the siding, so that is impossible for any wind to get in.

From T. T. S., *Stamford, Conn.*—I notice in the August number of *Carpentry and Building* that a correspondent at Wellington, Ohio, wishes the subject of inside sheathing to be discussed in *Carpentry and Building.* He claims that inside sheathing is not the best thing in use. I desire to ask if he will not kindly give some reason why it is not right. As soon as he shows his hand he will no doubt get all the attention he desires. I know many architects who fully indorse the use of inside sheathing. I employ it and see no reason why it is not a good thing to use.

From S. B. B., *Appleton, Wis.*—I desire to say to your correspondent, "S. F. B.," of Wellington, Ohio, that his head is level with regard to inside sheeting. I have never known an architect to specify inside sheeting; all say sheet outside every time. My way is to sheet the outside of the building with planed and matched 6-inch lumber; then cover with building paper, and after that side or shingle, as the case may be, or put on whatever finish the plans call for. "H. G.," of Medina, Ohio, says in

the October number of *Carpentry and Building*, "Do not sheet on the outside of the building." I ask, Why not? His answer is, because the siding gets wet on the inside and will rot the sheeting. Now, I want to know what kind of work "H. G." does that admits of the siding getting wet, as he explains. He goes on to say that he once built a house and sheeted it on the outside. Ten years later he built an addition to the same house, and in taking off the siding where the two joined he found the sheeting and the siding rotten. I raise a question whether a good, honest job was done on that house in the first place. Did the siding have plenty of lap, say, 1½ inches? I once built a house, and sheeted it on the outside with matched sheeting. I covered the same with building paper and then put on the siding. Nine years afterward I built an addition to the same house, and took off some of the siding to join the main part. I found the sheeting as perfect as the day it was put on. The building paper was as good as new; there was no rotten sheeting and no rotten paper. My advice, therefore, is to sheet outside always. I do not object to inside sheeting as additional, but if you do sheet inside, do not fur out for lathing; instead, nail the laths flat on to the inside sheeting. If "H. G.," after he has built one of his houses without sheeting on the outside, in a case where he sides or shingles on to the studding, will take the trouble to get idside of the building, and, going up to the top of the walls, will look down on the inside of the wall, he will discover between the studs, where his siding laps, streaks of light—or, in other words, air-holes. Now, in this Northern country we do not need wind holes; accordingly we sheet on the outside, covei the sheeting with paper, and then over all put our siding or shingles. We nail down perfectly flat and solder in such a way that no air can get through.

Trestle Construction.

From T. D. W., *Moshannon, Pa.*—Will some practical reader of *Carpentry and Building* give me the best and most correct way of getting the length and cut of diagonal or batter posts on trestles? Also the most simple way of getting the length, by figures, where a certain batter per foot is required? The lack of familiarity with the methods above-mentioned has been a source of inconvenience for a long time, for I have never had the opportunity of instruction in this particular direction, and, as I am a carpenter for a coal company, the information is very often demanded.

Note.—We shall be glad if some of oui readers will reply direct to this correspondent's question. We would refer him, however, to what was known as "Simple Problems in Framing," published in the first volume of *Carpentry and Building*—namely, the issues for July and September, 1879. These have a bearing upon the question which he raises.

It has only been within a comparatively recent period, say 15 or 20 years, that any one in the lumber trade could be induced to say a good word for cottonwood or acknowledge that there was much hope of its ever being utilized in any considerable quantity. Indeed, there was at that time no particular demand for the peculiar qualities which have since been found to make its use so desirable. Nor did the first attempts to saw and dress cottonwood increase its popularity or prospects. Its woolly grain made it exceedingly hard to work with the machinery then in use, and occasioned no end of trouble, while the toughness of the wood gave the saw an almost irresistible tendency to run. These difficulties have been overcome in a large measure by the use of improved and stronger machinery, but even now it is not counted an easy wood to work; the saw must be heavy and sharp, and the planing knives in extra good condition, or there will be annoying stoppages.

Quality of Bricks.

Three main points with reference to bricks have to be taken into account. 1. The power of resistance under pressure; 2, the appearance of the fracture, which should present an even texture, and a fine and brilliant grain, without cavities in the interior, and neither ribbony nor stony; 3, the exterior, which should be smooth and regular, the angles and edges sharp and straight. When the size of the bricks is equal throughout the mass it is a proof that the brick earth has been well prepared and the bricks generally well made. A brick, when struck, should give forth a clear, ringing sound. Good bricks are generally of a dark reddish-brown color, and sometimes they show vitrified spots on the surface; it is not well, however, to depend too much on this last fact, for it is often only an indication of the amount of heat to which the brick has been subjected, while the clay of which the brick is made may be impure and ill prepared. Bad bricks are readily recognized by their reddish-yellow color, but still more by the dull sound which they emit when struck; their grain being soft they crumble easily, and absorb water with avidity. A good brick should not absorb more than about one-fifteenth of its own weight of water; it should appear, and in reality be, dry. A brick that does not take up any water at all is too much burnt; the mortar adheres to it imperfectly, but it is a good conductor of heat. Such bricks may be used in damp soil and for pavements. When a brick left in water either scales or swells it is of bad quality and contains caustic lime. A brick which, being made red-hot, and then having water poured on it, does not crack, is of extraordinary and rare quality, and those which have borne the effect of moisture and dryness during two or three winters without scaling or cracking are excellent. In order to try if bricks will bear the effect of frost, let one be boiled for half an hour in a solution of sulphate of soda, saturated cold, and then suspended by a string over the vessel in which it has been boiled. In 24 hours the surface of the brick will be covered with small crystals; the brick is then to be immersed again in the solution until the crystals disappear, and again suspended, repeating this operation for five days, the crystals reforming after each immersion. If after this treatment a number of particles of the brick are found at the bottom of the vessel containing the solution, the bricks are incapable of supporting the effects of frost.

Ice Houses.

About this season of the year some of our readers address us inquiries with reference to the construction of Ice-houses. Anticipating letters that we feel certain will reach us in a short time, and the answer to which if published in due course will appear later than would be of service to our readers, we present the following, for which we are indebted to the *American Architect:*

1. The ice-house floor should be above the level of the ground, or at least, should be sufficiently above some neighboring area to give an outfall for a drain, put in in such a way as to keep the floor clear of standing water.

2. The walls should be hollow. A 4-inch lining wall, tied to the outer wall with hoop iron, and with a 3-inch air space, would answer; but it would be better, if the air space is thoroughly drained, to fill it with mineral wool, or some other substance, to prevent the movement of the air entangled in the fibers, and thus check the transference by convection of heat from the outside to the lining wall.

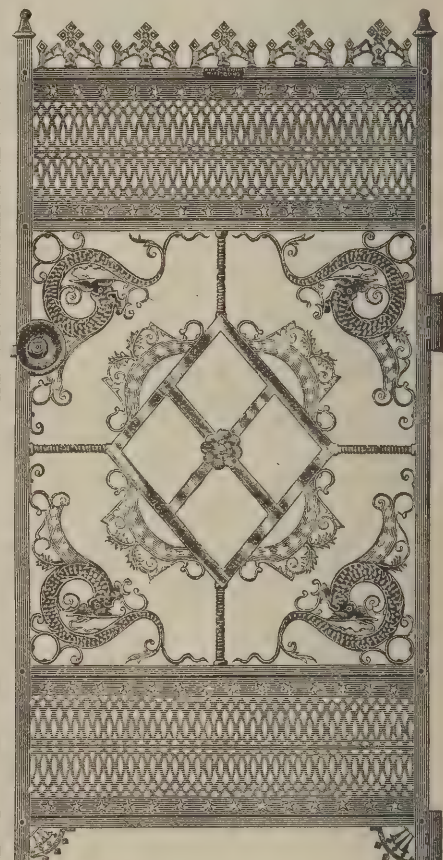
3. A roof of thick plank will keep out heat far better than one of thin boards with an air space under it.

4. Shingles will be much better for roofing than slate.

5. It is best to ventilate the upper portion of the building. If no ventilation is provided, the confined air under the roof becomes intensely heated in summer; and outlets should be provided at the highest part, with inlets at convenient points, to keep the temperature over the ice, at least, down to that of the exterior atmosphere.

Brass Gates.

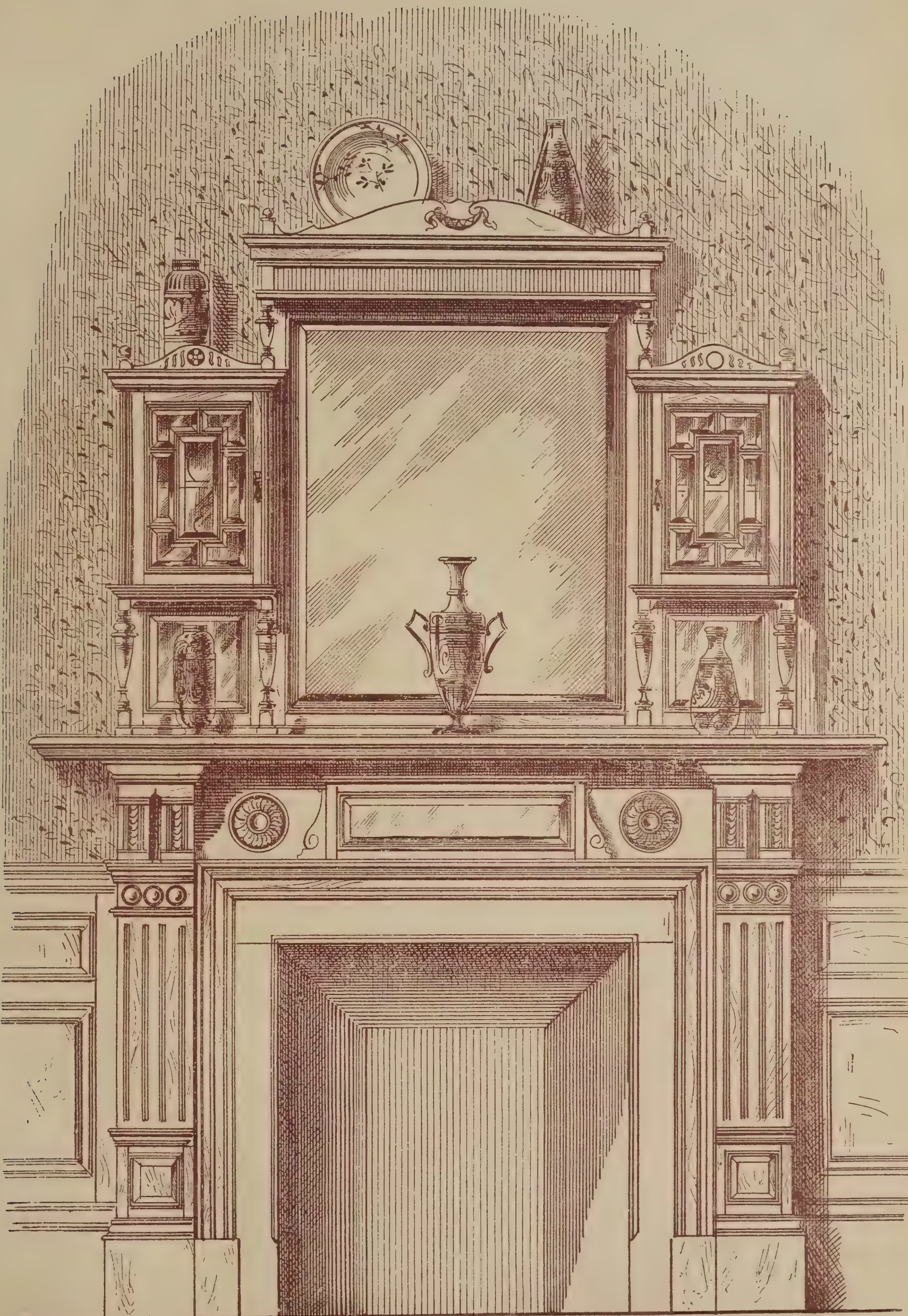
It is the fashion at the present time to use wrought metal gates of elaborate design for office buildings, theater buildings and other places. Manufacturers rival each other in the character of the



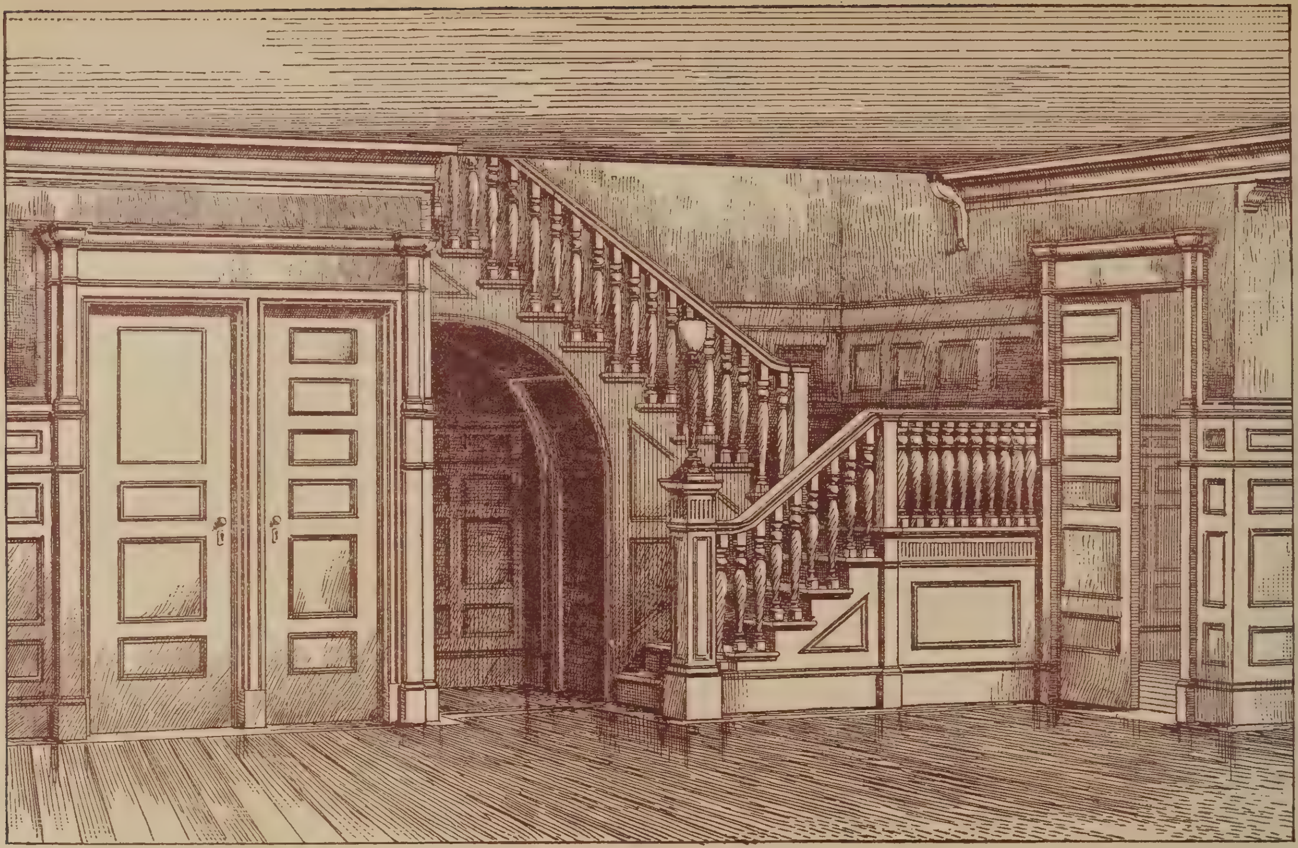
Brass Gate, Bijou Theater, Pittsburgh.

goods produced, as well as in the designs which are employed. In the accompanying engraving we show one of a set of gates recently made by the Pittsburgh Brass Company, Limited, for the Bijou Theater of that city. The design, as will be seen, is very ornate and is composed of brass, both wrought and cast, combined in a way to secure great strength, while at the same time producing a pleasing design.

Basswood may be enormously compressed, after which it may be steamed and expanded to its original volume. Advantage has been taken of this principle in the manufacture of certain kinds of moldings. The portions of the wood to be left in relief are first compressed or pushed down by suitable dies below the general level of the board, then the board is planed down to a level surface, and afterward steamed. The compressed portions of the board are expanded by the steam so that they stand out in relief.



Design for a Dining-Room Mantel.

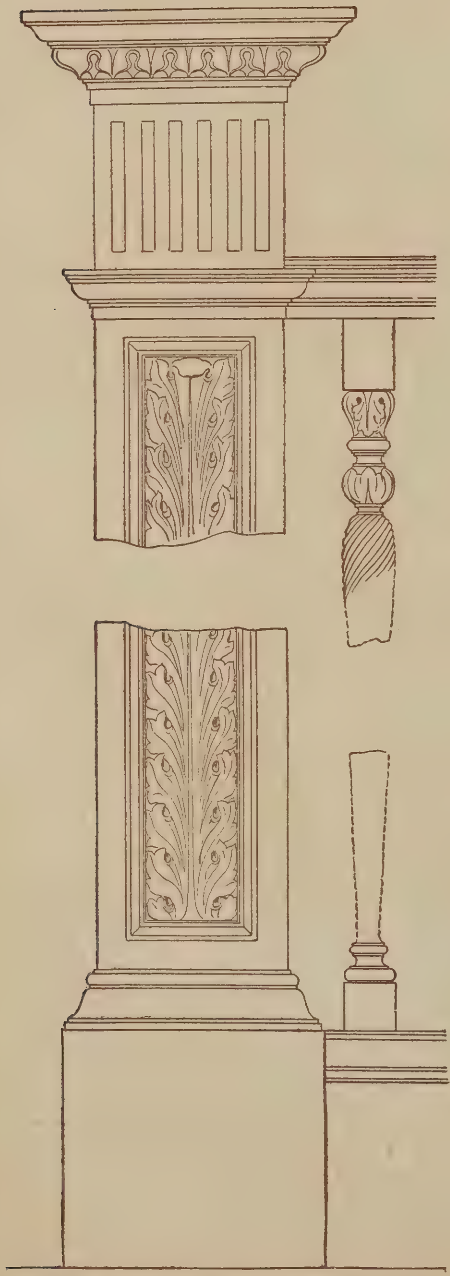


PERSPECTIVE VIEW IN HALL.

Plans and Details of House in West 82d St., New York.

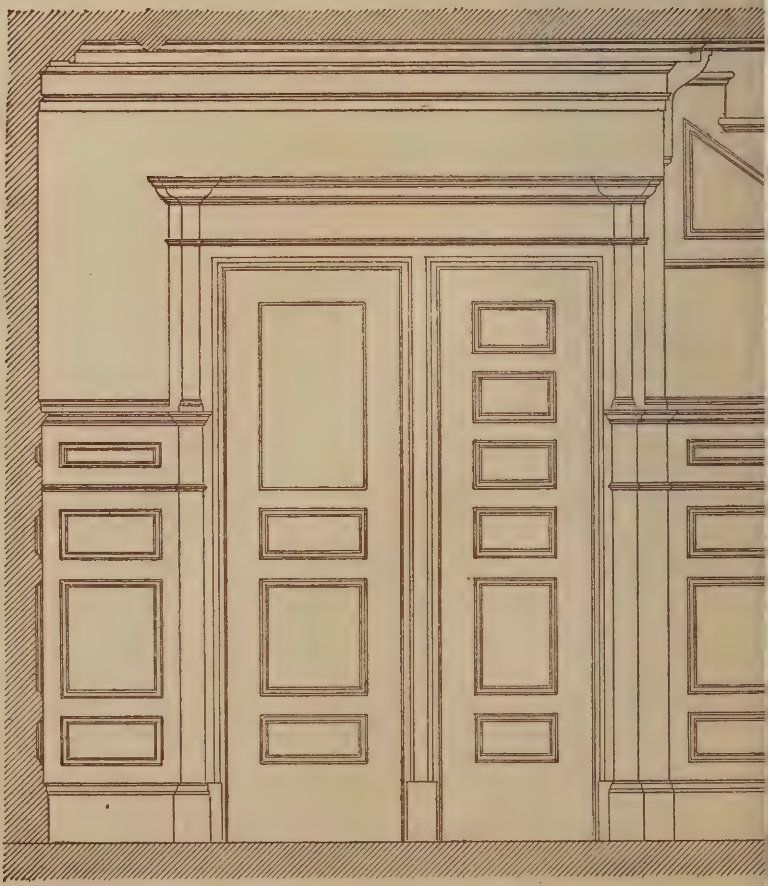
EMANUEL GANDOLFO, Architect.

V. DEL. GENOVESE, Builder.



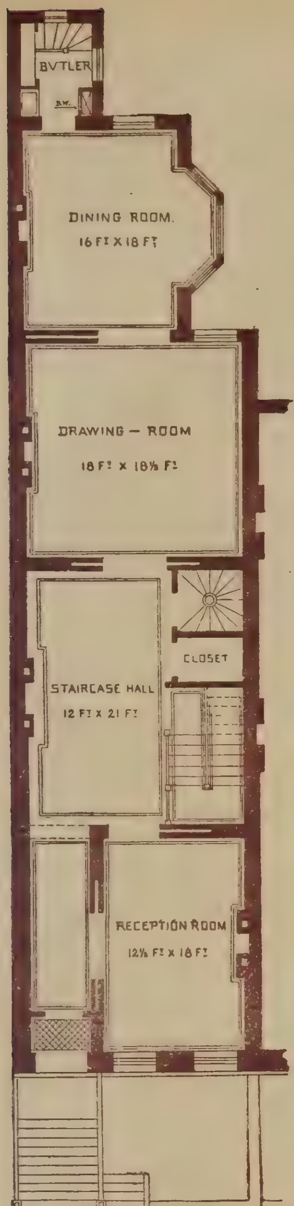
NEWEL POST AND BALUSTER.

Scale, 3-4 Inch to the Foot.

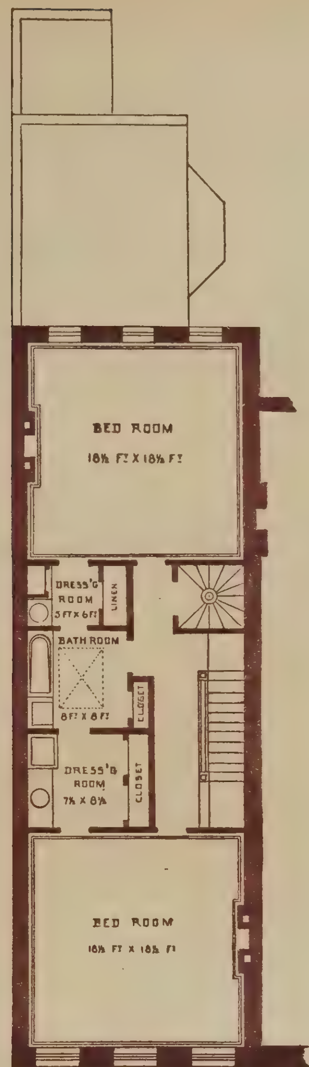


ELEVATION IN HALL, CORRESPONDING TO PERSPECTIVE VIEW.

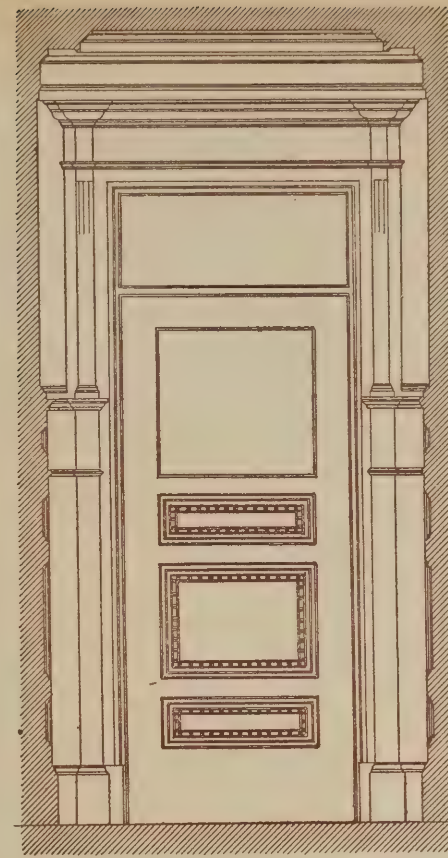
Scale, 3-8 Inch to the Foot.



FIRST FLOOR PLAN.

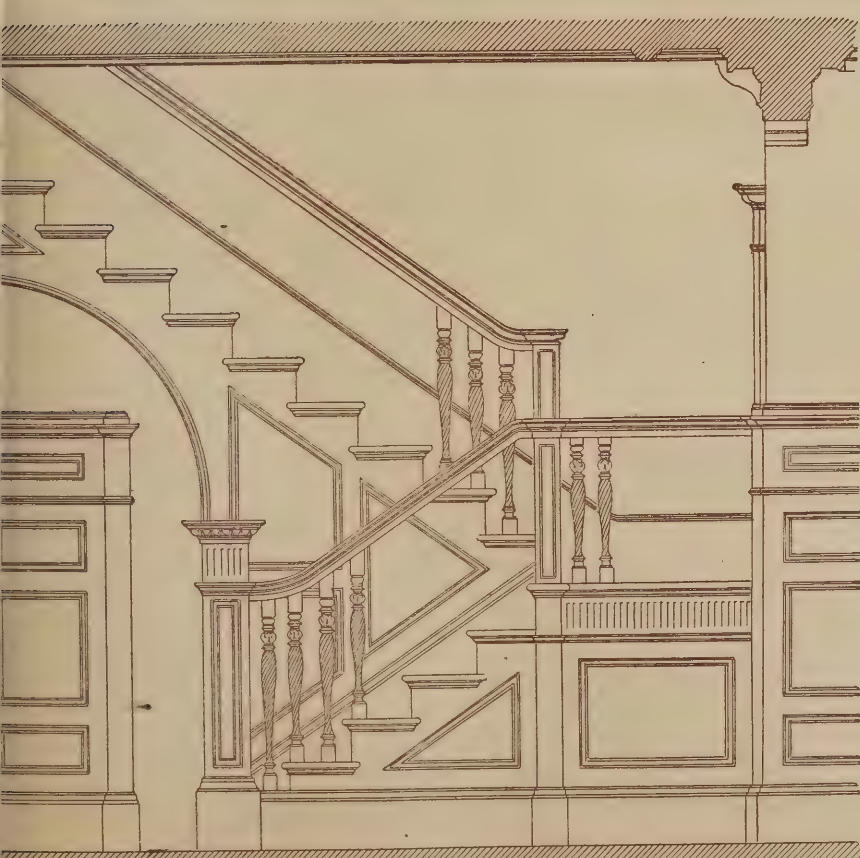


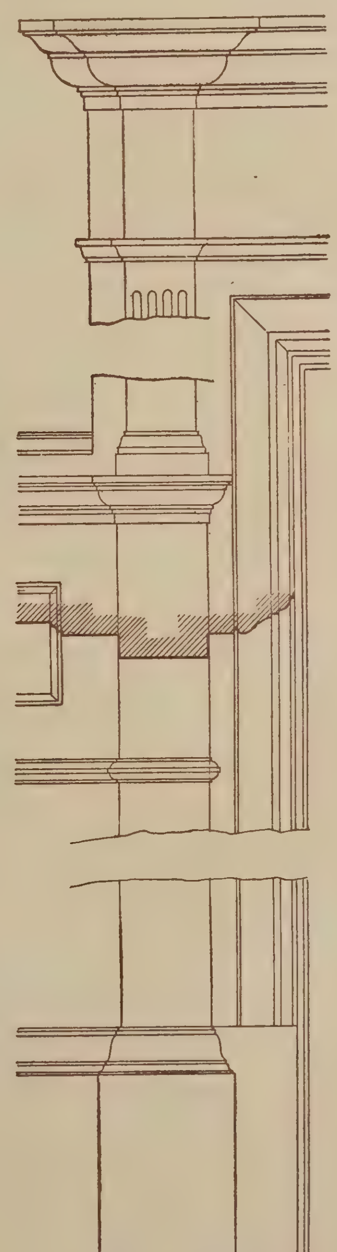
CHAMBER PLAN.



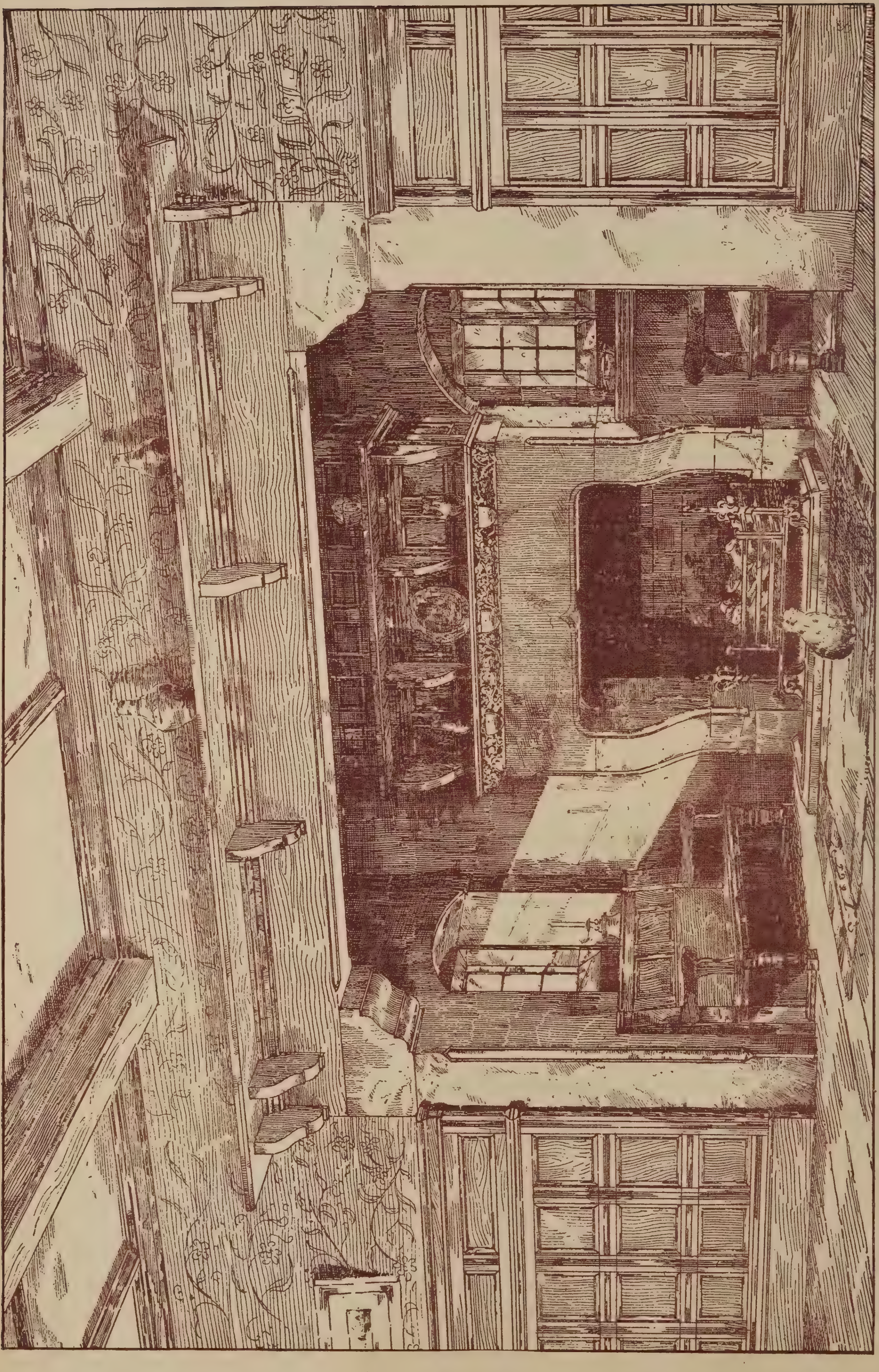
INSIDE OF VESTIBULE DOOR.

Scale, 3-8 Inch to the Foot.





TRIMMING OF DOOR,
WITH STYLE OF WAINSCOTING, FIRST STORY.
Scale, 3-4 Inch to the Foot.



Chimney Corner in an English Dining-room.

MASONRY.

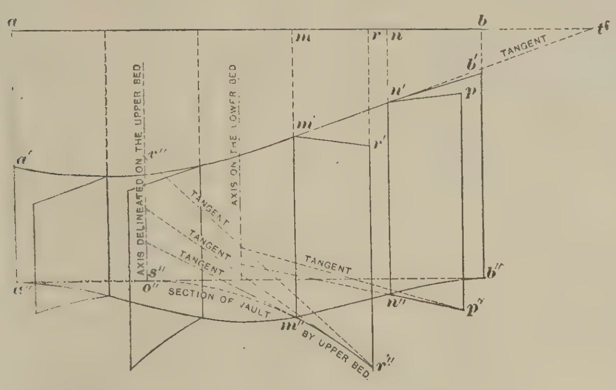
Masonry and Stone Cutting.

(Continued from page 45, February.)

MOLDS.

Having drawn all the voussoirs of the archway in projection on plan and elevation, we have now to get the exact outline of the faces of each voussoir, so as to cut out in cardboard the molds we require for working the stones.

The soffits of the voussoirs can be easily developed, for they form part of a cylinder, the intrados of the arch. In Fig. 16 we have made the straight line $a\ b$ equal to the circumference of the arch and we have shown by the points $m\ n$ the portion thereof which belongs to the voussoir we intend



Masonry and Stone Cutting.—Fig. 16.—Development of Voussoirs.

to cut out. We draw on the development the direction of the arrises M and N and as many other generators of the cylinder as we may require; then, carrying the distances $m\ m' = $ G M', $n\ n' = $ H N', &c., we got the development $a''\ m''\ n''\ b'$ of the curve of penetration into the vault. The development of the soffit of the voussoir considered is, therefore, comprised within the quadrilateral figure $m'\ m''\ n''\ n'$.

To get tangents required for drawing these curves of the developed cylinder, use the usual methods of descriptive geometry, remembering that the positions of elevation and plan are here reversed—t^3 is the trace on the plane of our elevation of tangent Nt, and Nt^8 is the length which we have to carry from n to t^4—so as to get $n'\ t^4$, the tangent required. The same operation applies to finding the tangents of the other curve. Simplifications are also obtained by taking the ground line at different levels to get the traces not too distant from the drawing.

To get the molds of the bed joints, we turn down the planes of the joints round the arrises of the voussoirs such as M. The upper arris will then occupy the position $r\ r''$, in which distance $r\ r'$ is equal to the distance

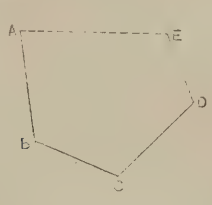


Fig. 17.—An Irregular Polygon.

S R' of Fig. 15. The arras $m'\ r'$ is a straight line, but the arras $m''\ r''$ is a part of an ellipsis, and to draw it a few intermediary points are required, found by the same method by which the points $m''\ r''$ were found. A simplification is obtained if we delineate on the turned-down plane of the bed joint the axis O O'' of the arch; then we know that the curve $m''\ r''$ prolonged will pass through O O'', and that the tangents to the curve will cut the turned-down axis in the same points, s'' and v'', as on the plan.

OPERATIONS FOR CUTTING THE VOUSSOIRS.

The voussoirs can be cut by two different methods; in the one squares are only used, in the other bevels. In the first method we begin by forming a parallelopiped, of which the pentagon, Fig. 15, M N P Q R is the base, after which we cut off the portions of the parallelopiped which lie outside the finished voussoir. This is by far the safest method of stone cutting; on the other hand, it is the more costly, as it involves working surfaces of operation which have to be destroyed afterward, and in some cases it involves a great loss of material. In the second method the surfaces of the stone are worked successively by means of bevels equal to the angles formed by the arrises of the stone. In this method of operating every mistake made entails further mistake, and we should say that absolute accuracy is rendered thereby impossible. It is, in fact, a method similar to that which a draftsman would employ if he endeavored to copy the polygon, Fig. 17, by drawing successively the sides A B, B C, C D and D E, measuring the angles with the aid of protractors. It is evident that, starting from A, he would have little chance of reaching E accurately, whereas by taking A E as a basis, and drawing a series of triangles, he would get the points D, C, B without difficulty, and absolutely correct. Nevertheless, on account of its

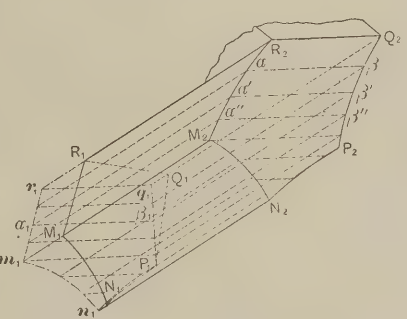


Fig. 18.—Cutting According to the First Method.

cheapness the method of bevels is invariably preferred by stonemasons.

In Fig. 18 we show the operations of stone-cutting according to the first method. We select a stone in the shape of a prism, the base of which is at least equal to the dotted rectangle, which surrounds the elevation of the voussoir M N P Q R, Fig. 15, and the length of which is equal to the greatest dimension of the voussoir measured on plan. Once the basis of that prism has been worked plane, a mold, $m_1\ n_1$ P$_1$ $q_1\ r_1 = $ M N P Q R (see Figs. 18 and 15), is delineated on that surface, taking care that one of the sides, such as $m_1\ r_1$, corresponding to a bed-joint, shall follow the quarry-bed of the stone. This operation accomplished, the mason can form a prism by working the other faces of the stone with the help of a square. He will then apply the mold, Fig. 16, $m'\ r'\ r''\ m''$ on the surface which starts from $m_1\ r_1$, Fig, 18, placing the point m' in M$_1$, Fig. 18, at a distance m_1 M$_1$ = G M', Figs. 18 and 15, and r_1 R$_1$ = R' S', Figs. 18 and 15; thus he will draw on the stone the real outline R$_1$ M$_1$ M$_2$ R$_2$ of the bed-joint. The workman will delineate likewise the other bed-joint on the surface which starts from the arris P$_1$ n_1.

As to the soffit of the voussoir, it is a portion of a cylinder which can be worked with the help of a square or with the help of templets, such as those shown in Fig. 12. On that cylindrical surface the workman will apply a flexible mold, cut according to $m'\ n'\ n''\ m''$, Fig. 16, and thereby he will be able to delineate on the stone the curves M$_1$ N$_1$, M$_2$ N$_2$, Fig. 18.

The upper horrizontal joint, and the vertical joint of the voussoir, are simple

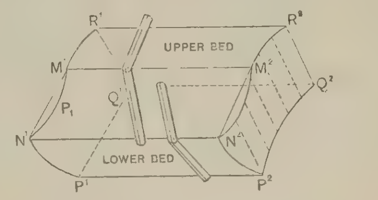


Fig. 19.—Cutting with the Aid of Bevels.

planes. The mold for the horizontal one is found on plan, Fig. 15, as R' R'' Q'' Q', which we place in R$_1$ R$_2$ Q$_2$ Q$_1$, Fig. 18. On the face of the vertical joint we have only to join Q$_1$ and P$_1$ to get the arris at one end—whereas, at the other end, which is the one where the voussoir forms part of the surface of the vault, a templet cut according to the curves of the vault will enable us to delineate the curve Q$_2$ $\beta\ \beta'\ \beta''$ P$_2$, Fig. 18.

The surface of the vault will be cut by following horizontal generators thereof from $\beta\ \beta'\ \beta''$, &c. To get these generators we simply draw parallels to them on the basis of the prism, such as $\beta_1\ a_1$, and then parallels to the upper arrises, as $a_1\ a^1$, Fig. 18, which gives us the points $a\ a'\ a''$, &c., required to guide the workman's ruler and chisel when cutting the stone from β to a.

Fig. 20.—The Bevels.

This operation completed, the portion of the stone at the base of the prism which does not belong to the voussoir is cut off, and the voussoir is then completely dressed.

In Fig. 19 we show the method of stone cutting with the help of bevels, such as those delineated in Fig. 20. Bevels are articulated pieces of metal or wood capable of being set at any given angle, and then used as common squares.

We begin the operation by dressing the surface of the natural bed of the stone and delineate thereon by means of a mold the outline M$_1$ R$_1$ R$_2$ M$_2$, Fig. 19, of the upper bed-joint. Through the arris M$_1$ M$_2$ the workman can, by means of a bevel, dress a plane, forming with the plane of the bed-joint an angle equal to R M N, Fig. 15. This will be the operation plane from which the soffit of the voussoir will have to be cut out. Starting from this operation plane, and with the help of the bevel already used, we get the plane of the lower bed-joint. After having marked on these surfaces the contour of the molds, the surface of the head of the voussoir on the outside wall face can be cut, for it is given by the arrises M$_1$ R$_1$ and N$_1$ P$_1$, Fig. 19. On that surface the workman will delineate the other two arrises R$_1$ Q$_1$ and P$_1$ Q$_1$ of the head face, which can be done with the help of a pair of compasses by taking the real lengths of R Q and P Q in Fig. 15, and marking off thereby the point

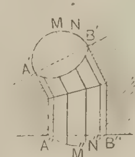


Fig. 21.—Two Vaulted Surfaces Meeting in a Groin.

Q_1 on the stone. This done we can easily cut the surface of the upper horizontal joint by the help of the arrises R_1 R_2 and R_1 Q_1, already obtained; and likewise by the help of the arrises P_1 P_2 and P_1 Q_1 the surface of the upright joint can also be obtained. The cylindrical surfaces can

Course in Pattern Making, Sibley College, Cornell University.

In the January and February issues we presented portions of the illustrations of a course in pattern making in use in Sibley College, Cornell University, Ithaca, N. Y.

the sand in one part of the flask. Its application on a more practical scale is shown in Fig. 31, in which a cone pulley is similarly made. At this stage the student is initiated into the mysteries of making a flange pulley, a cast crank, a quarter turn with its core box and a half turn with

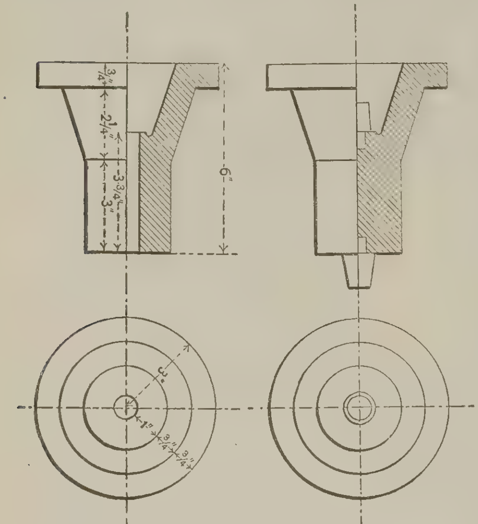


Fig. 27.

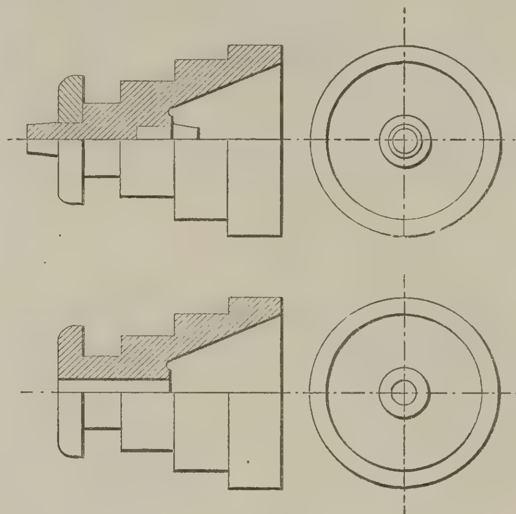


Fig. 31.

Fig. 33.

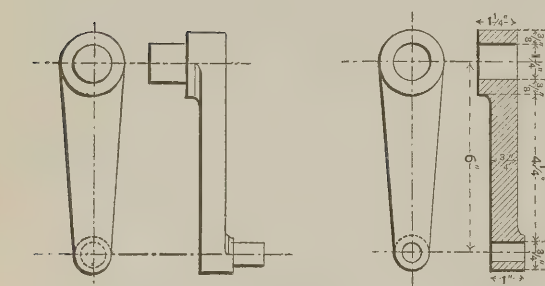


Fig. 28.

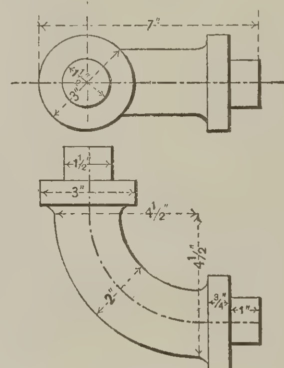


Fig. 32.

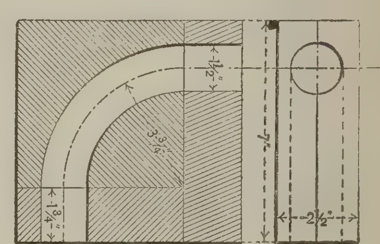


Fig. 34.

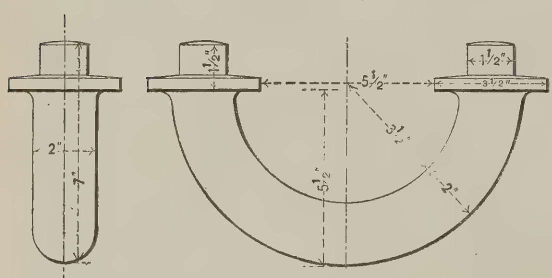


Fig. 29.

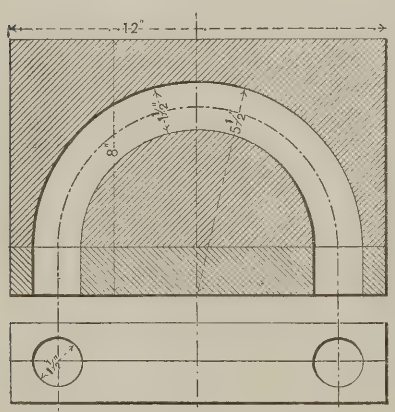


Fig. 30.

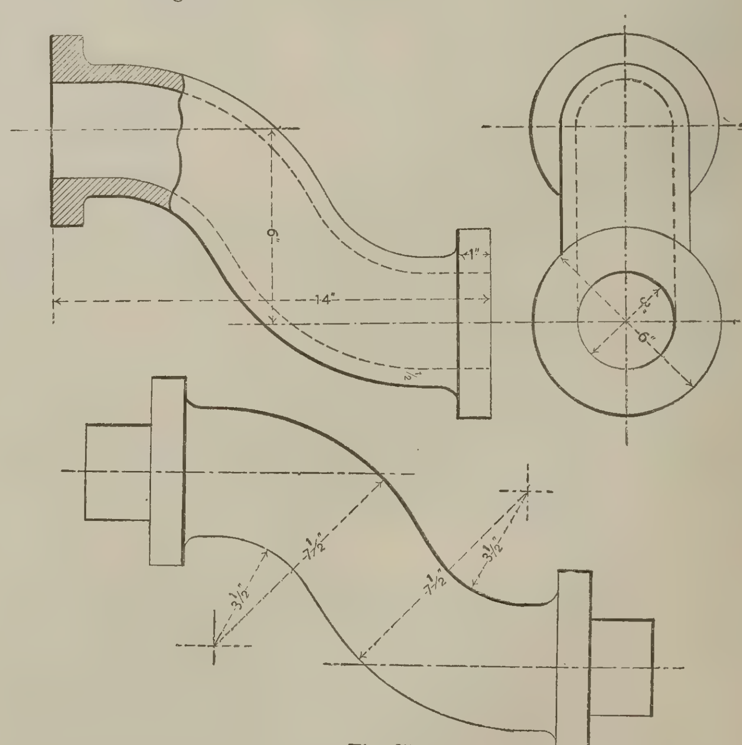


Fig. 35.

Diagrams Illustrating Part of the Course in Pattern Making, Sibley College, Cornell University, Ithaca, N. Y.—Scale, 2 In. to the Foot.

then be worked out as in the former method, the soffit of the voussoir, by the help of the templet M_1 ψ_1 N_1, giving the curve of the archway, the end of the voussoir forming part of the vault by means of the generators parallel to the arris R_2 Q_2.

(To be continued.)

Another installment of the cuts is now shown. Continuing the narrative where we broke off in the previous issue, the learner has presented in Fig. 27 an exercise in irregular molding, the pieces being of such a character that they must be partly cored and partly hollowed out by building up

its core, the latter being useful in the steam-fitting department of the institution. Then in order come an S-shaped piece, each example bringing into play a new tool in the pattern shop, a new method of construction, a variation in the plan of molding and some new points in the ma-

chine work, all being used in the finish of the piece. All of this information helps the student at some point later on in the course. In the next two designs the pattern is its own core box and requires care in bedding in the sand and in drawing, illustrating the most common difficulties met in such work.

(To be continued.)

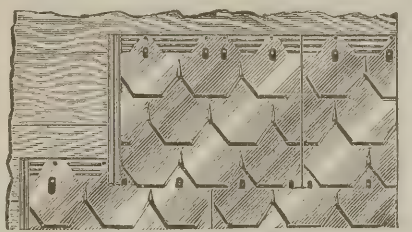
ROOFING NOTES.

Warm Roofs.

One of our English architectural exchanges has been discussing the construction of roofs as bearing upon the heating of the buildings over which they are placed. At the outset it says that in a recent paper an American architect alludes to the value of porous terra-cotta sheathing, set in lime mortar and bolted to T-irons, as a valuable feature of construction. Over the porous terra cotta pure asphaltum is placed, and then over this prepared paper is rolled on while the asphaltum is still hot. The paper, it is said, adheres closely and prevents the passage of moisture or rain. Valleys, hip rolls, gutters and flashings are made of copper and then the whole is covered with slate. The conclusion is that such a roof is found to retain the heat during the cold weather. With this for a text, our exchange comments upon it, with reference to the construction of roofs in Great Britain, as follows: "Few of our roofs are so constructed. Very often the felt sheathing and boarding are omitted, and the only covering is the cold-conducting slates imperfectly laid. The result is disastrous to comfort in a house. The artificial means of heating employed are unavailing in maintaining a comfortable degree of temperature, for the heat is wasted on cold surfaces, which speedily conduct it away. Unfortunately, expense is the chief consideration in building at the present day, and this is the reason why houses are so seldom provided with felt or paper sheathing. In churches, schools and the better lass of residences the roofs are boarded and felted, adding much to the degree of warmth maintainable, and, we may add, materially saving the fuel required to keep up a desirable temperature. As the warm expired air ascends, it is quickly chilled by a cold roof, and falls, to be re-breathed by those in the church or school, thus making ventilation more difficult. Those who contract for warming these buildings appear to lose sight of the roof in their calculations. In determining the loss of heat they adopt certain coefficients for the loss by walls, window surfaces, floors, &c., but omit the heat abstracted by the roof, which is very considerable. We have still to educate the builder in the choice of materials. In this country, exposed to all variations of temperature, the covering of roofs with felt or asphalted material like paper ought to be considered as necessary a precaution as slating it. Our old thatched and tiled houses were far more retentive of warmth than any of the modern slate-covered villas erected round London. The provision of a layer of felt or prepared paper, like the Wilesden, below, the slating would insure a certain amount of retentiveness and warmth in the rooms of a house that would quickly compensate for the trifling extra cost entailed. In an ordinary roof the cost would not be more than from £4 to £5 to lay the asphalt roofing felt, if we reckon the felt to be 2d per foot super. It will be probably a long time before the comfort of a house will be thought of sufficient importance to make a building by-law of roof construction; but the architect is certainly justified in adopting everything that can insure the health and comfort of his employer by the employment of reasonable and inexpensive materials.

Eastlake Shingle.

The accompanying engravings illustrate the features of a new form of metallic shingle which Montross & McCurdy, of Toronto, Canada, are putting upon the market. Owing to the peculiar formation of the design it has been termed the Eastlake pattern. Sheets 20 x 28 in size are used in the manufacture, and the forms of nine shingles are included in a single plate. Three occur in the upper row, three in the lower row, with two complete shingles and two half shingles in the middle row. The flange is of the interlocking order, and is of the form shown in Fig. 2 of the engravings. The overlapping of individual shingles is made by horizontal grooves, as shown in the larger cut, and also by cleats which are adapted to bend over and



Eastlake Shingle.—Fig. 1.—General Appearance of Roof.

hold down the edge of the overlapping piece. Joints are broken, as will be seen by the cut. We have samples of this shingle before us as we write, and they would seem to be well adapted for covering large spaces, and to be laid with a small amount of labor. The cleats which hold down the lower edge of the overlapping

Fig. 2.—Cross Section Through Side Seam.

plates are riveted in position, and are adapted to be bent over and back against the surface they are to hold. This shingle has been manufactured for some time in Canada, but we believe it has not yet been introduced into the United States.

Tables of Expansion of Roofing Metals.

A very important point to consider in laying metal roofs is the expansion and contraction due to changes of temperature, for unless due allowance be made for the changing area of the metal the roof will buckle or crack. Experience has taught that copper and zinc require more care in laying than tin plate, because of their greater expansibility, and many special methods have been devised for laying the former metals. The exact expansion of the metals commonly employed in roofing is, we venture to say, not generally known, and we, therefore, think it will be of interest as well as of value to our readers to work out tables showing the expansion for degrees and different lengths of steel, iron, copper, lead and zinc. The figures given below for steel may be considered applicable to tin plates, as it is from this material that they are practically all made at present, and the coating of tin or lead makes no appreciable difference as to expansion. The figures for iron may be made useful in estimating the variations in a black or galvanized-iron roof. The first table, taken from Trautwein, shows the length of metal that will expand a linear unit per unit of temperature, the former being ⅛ inch and the latter 1° F.:

Expansion of	
Steel, untempered, for 1° F.	= ⅛ inch in 1,744 ft.
Iron, rolled, for 1° F.	= ⅛ inch in 1,562 ft.
Copper for 1° F.	= ⅛ inch in 1,088 ft.
Lead for 1° F.	= ⅛ inch in 658 ft.
Zinc for 1° F.	= ⅛ inch in 645 ft.

It may be assumed that the ordinary roof between winter and summer is subject to a variation of 150° F. in temperature, which is, if anything, a low estimate. As the allowance must be made for the extreme change in size, we have worked out the second table on a basis of 150° instead of 1° F.

Expansion of steel	for 150° F.	= 1 in. in 93.0 ft.
Expansion of iron	for 150° F.	= 1 in. in 83.3 ft.
Expansion of copper	for 150° F.	= 1 in. in 58.0 ft.
Expansion of lead	for 150° F.	= 1 in. in 35.1 ft.
Expansion of zinc	for 150° F.	= 1 in. in 34.4 ft

The next table shows the expansion reckoned per foot of metal.

Expans'n of steel	for 150° F.	= 0.0107 in. in 1 ft.
Expans'n of iron	for 150° F.	= 0.012 in. in 1 ft.
Expans'n of copper	for 150° F.	= 0.0782 in. in 1 ft.
Expans'n of lead	for 150° F.	= 0.02849 in. in 1 ft.
Expans'n of zinc	for 150° F.	= 0.02907 in. in 1 ft.

To find the expansion of any roof it is only necessary to multiply the dimensions of the roof in feet by the decimal of an inch in the above table opposite the metal of which the roof is made. The results will be the linear expansions both ways.

Items.

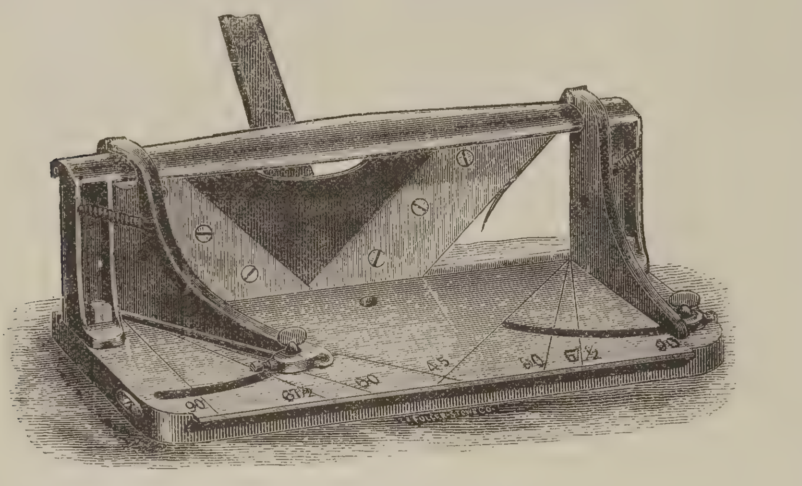
THE EXTENSIVE USE of tile for roofing purposes at the present time is one of the most significant events to which attention can be directed. Architects and builders in many instances are at present giving preference to the best materials for constructive purposes, and are choosing those styles which add picturesque dignity and the appearance of solidity for their structures. Prominent among those who are making a specialty of tilework may be mentioned J. K. Smith, of Waterbury, Conn. Mr. Smith's operations are not confined to any one part of the country. His trade is extensive in various directions. He has had men steadily at work in St. Augustine, Fla., for example, for nearly two years past, and in that time had laid upward of 1800 squares of tile. As much as 100 tons of Pursell's elastic cement has been used in laying these tile. Mr. Smith informs us that this material has proven very satisfactory for use for this purpose. Among numerous contracts in New York Mr. Smith is engaged in covering 52 houses located at Seventy-third street and West End avenue. These are being built by W. J. Merritt & Co. Twelve of the houses are covered with what is known as brown Spanish tile, and 44 of them with red Spanish tile. The work is first class in all particulars. The flashings and valleys are of copper, and the cornice-work on the buildings is likewise of copper. The source of supply of tile at present is almost exclusively Akron, Ohio, and prominent among those who are furnishing material of this kind are J. C. Ewart & Co., of that city.

HOW A PROMINENT cornice man and roofer has been honored by a reigning sovereign is evidenced by a bit of parchment that was delivered a short time since to Mr. Edward E. Scribner, of the Scribner–Libbey Company, St. Paul, Minn. The diploma, or patent, or whatever it may be called, purports to emanate from the Emperor, Grand Duke, &c., reigning over the Western Carnival, which was a feature of St. Paul and vicinity a short time since. Omitting the seals and other parts which cannot be readily reproduced in this connection, the phraseology is as follows: "We, King Borealis, Emperor of the Great Northwest, and Grand Duke of the Polar Region, do hereby declare that it is our Royal wish and pleasure to create Edward E. Scribner Duke of Portland and a Peer of the Royal Realm, in testimony of his many virtues and of our good will. Given under our hand and our great seal, at our palace, St. Paul, Minn., this 2d day of February, Anno Domini MDCCCLXXXVIII. (Signed) Borealis, Rex." The emblem of the seal on this notable document is a white bear.

NOVELTIES.

Universal Trimmer.

Figs. 1 and 2 of the engravings represent a trimming device put upon the market by the Fox Machine Company, Nos. 4 to 8 Erie street, Grand Rapids, Mich. It is adapted for trimming in numerous places, and will cut either with the grain or across the end of a piece of wood without breaking the part last acted on, the work being cut being supported by the gauge which lies close to the knife in any position. This feature enables the device to make a shear cut. The makers claim that much care has been used in the design and construction of the machine. The gauge, as will be readily gained by reference to the cut, can be set at any angle. Two gauges are provided, one at either end of the machine, and certain often-recurring angles are indicated by lines on the bed of the machine. By loosening the spring and swinging the gauge around the end near the thumb-screw is used as a guide in cases where it is necessary to trim the joints of pulley cants and similar work. Strong leverage and regular motion is obtained by using a loose gear that rolls on the bottom of the rack. It will be noticed that the carriage moving in grooves in the bed and frame is thoroughly supported, and the knives being securely fastened in place, the carriage is compelled to move in a straight line. The makers point out that by taking a succession of short cuts a curved line can be followed. Other features of the machines will readily be gained by inspection of the engravings.



Novelties.—Fig. 1.—Universal Trimmer Made by Fox Machine Company, Grand Rapids, Mich.—Front View.

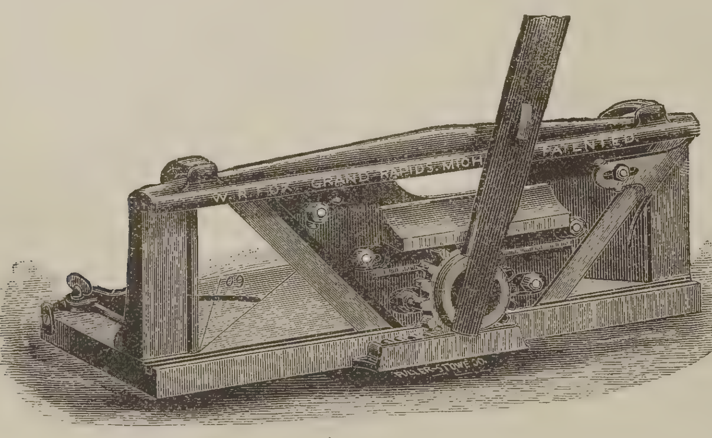


Fig. 2.—Rear View of Universal Trimmer.

Combination Roller Gauge.

What is known as Barrett's Combination Roller Gauge, illustrated in Fig. 3 of the engravings, is a device just being introduced by C. E. Jennings & Co., Nos. 79 and 81 Reade street, New York. It may be described as a tool made expressly for wood-worker's use, and having special advantages for lining out work, either single or double, measuring depths and striking circles. Unlike many other gauges it is composed entirely of metal. The head is a gray iron casting, and the beams are of steel graduated. All the parts are finely polished and nickel-plated. The shorter beam slides into the head flush when the gauge is being used single. In the place of a spur rolls made of excellent steel beveled to a fine edge, hardened, and put upon the shanks with steel screws, hardened, and adapted to revolve, are employed. This construction enables the rolls to run over coarse grains, knots and roughness with perfect ease and accuracy. The result is a well designed and perfect working tool. When used as a double gauge the shorter beam is extended through the face plate, and is fastened by its set-screw at any point, when in this shape being as indicated in the engraving. The graduation on the long beam serves for both adjustments. We understand that those who have tried this tool are well pleased with it. The sample before us certainly seems to be something that many mechanics will appreciate.

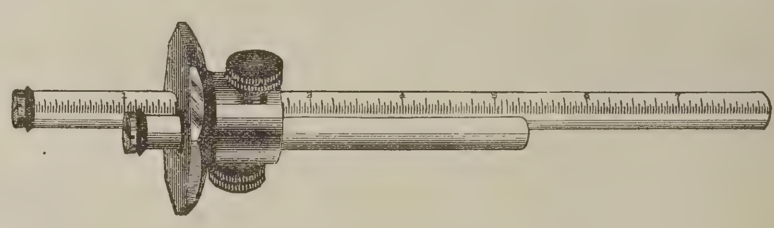
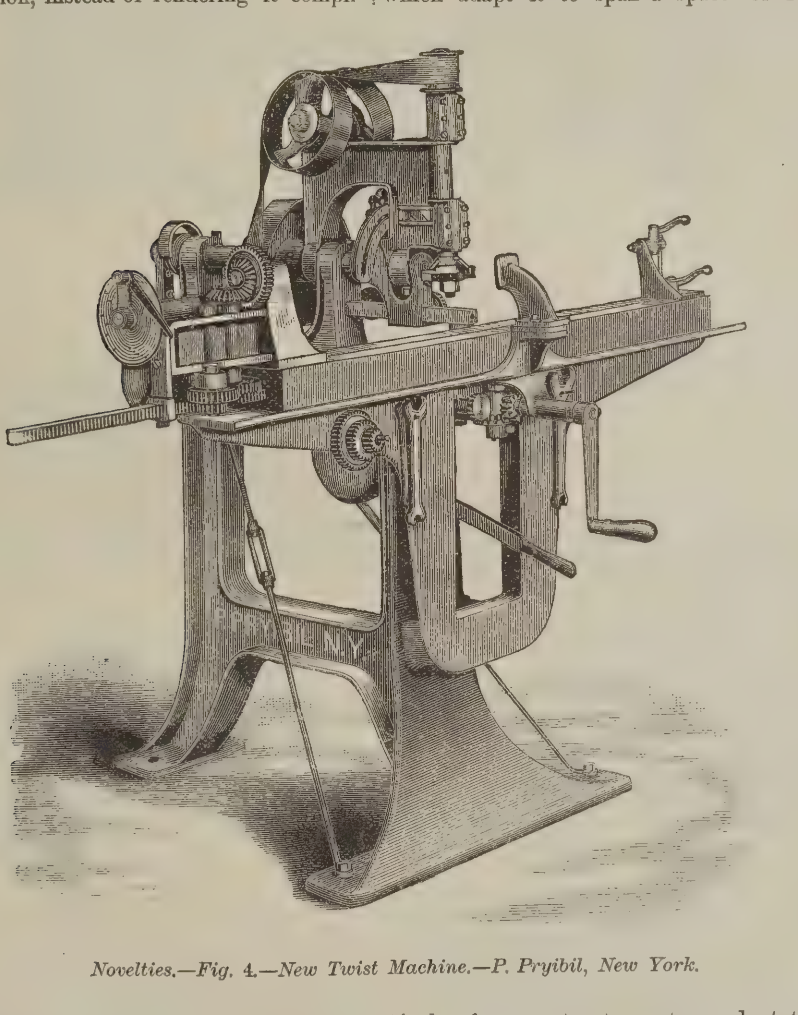


Fig. 3.—Barrett's Combination Roller Gauge.

New Twist Machine.

The machine shown in Fig. 4, which is just being put upon the market by P. Pryibil, Fortieth street and Tenth avenue, New York, is adapted for producing all kinds of spiral or rope moldings, either straight, tapered, curved or oval. It will make right, left and so-called pine-apple cuts, and will also do straight fluting. It is adapted for cutting from 1 to 6 threads on a piece, and will make any degree of twist one turn in $1\frac{1}{2}$ inch of length to one in $10\frac{1}{2}$ inches. The cutters employed are similar in shape and arrangement to those used on variety shapers. They are held between collars that are somewhat similar to those used upon machines of the class last mamed as manufactured in the establishment referred to; but are so arranged that the knives have a peculiar action, cutting from the outside in and making a smooth cut, even against the grain. They also revolve in the same direction whether the twist be right or left, and one set will produce several different shapes of work. Changing from one degree of twist to another or from right to left occupies less than one minute of time. The machine swings 8 inches and is adapted to receiving 42 inches between centers. In the manufacturer's circular before us describing this device, there is a reference to twist work and the principles upon which machines have been constructed that is of more than passing interest to our readers. The beauty of twist work and its great popularity have induced many inventors to undertake to make machines for its production, with the usual result. Many failures, it is pointed out, have occurred; but each has been a stepping-stone to ultimate success. Each has added to the sum of knowledge upon the subject, and has shown what cannot be done if nothing further. The experience of the establishment above referred to is an instance in point, for there have been no less than five machines brought out by it during four years past, each of which has been an important improvement over its predecessor. The present machine was undertaken after a thorough review of all existing forms, of whatever make, including hand and power feed, single or double side or fly cutters, end or boring cutters, and the result is as above described. The first machine made by Mr. Pryibil had solid cutter heads and knives like those used on straight molding machines. These cut across the work at the angle of the twist; one side of the bead was cut across the grain and became so rough that a good finish was very difficult. To avoid this difficulty some machines have been made with two cutter heads and two sets of knives placed close together and turned in opposite directions. This necessitated complicated construction, as well as extra care, in order to keep the machine in proper adjustment. Two separate and complete sets of cutters in such machines are necessary to cut right and left twists — a serious item when it is considered that each set comprises four slotted and formed knives. Another form of cutter device producing smooth work, but which, it is claimed, defeated its own end, is the end or boring cutter. This may be described as a single knife on the end of a spindle which is square with the work and which at the beginning of

the cut is fed endwise, causing the cutter to bore its way to the proper depth, over which it cuts sideways. Right and left knives are necessary and they and the belt must be changed in order to cut right and left twists. Such a cutter, however, does not cut smoothly—in fact, it simply scrapes. Every practical man knows how slow an operation scraping is, and how quickly a knife loses its edge when so used. The boring cutter, it is claimed in the circular before us, has but one advantage—low cost both of cutter and machine. So much for theory. A former machine, made by this establishment, was provided with both kinds of cutters with a separate spindle for each, and no one ever used the boring cutters except for double spiral work where two separate and disconnected spirals were cut on one stick, each one twisted around but not touching the other. This one kind of work cannot be made without the fly-cutter, although such a machine will do everything else, including single-spiral work. Recognizing the greater capacity of the fly-cutter and its ability to hold an edge, the inventors set themselves to work at the task of making it cut smooth, and announce that they have succeeded in doing this, and also, at the same time, have simplified the construction, instead of rendering it complicated and dangerous. The net result is embodied in the machine above briefly described.



Novelties.—Fig. 4.—New Twist Machine.—P. Pryibil, New York.

New Sheet-Metal Lath.

Hodges Brothers, Detroit, Mich., have just brought out a sheet-metal lath, illustrated in Fig. 5 of the illustrations. It is known in the trade as Kinney's patent. It is claimed, in point of stiffness, clinch and economy in plastering that it has never been surpassed by any lath ever introduced. It will be seen by reference to the above cut that, although the metal is slitted and then corrugated and finally opened, the whole remains one integral sheet, the strips of which are alternately upright and in inverted V shapes. In presenting this lath to the public the makers inform us that they desire the following points of superiority carefully considered. It can be readily applied by any intelligent laborer, simply because of its stiffness and bridging quality, which adapt it to span a space of 16 inches from center to center, and at the same time maintain a sufficiently strong lateral pressure. No furring is required in the use of this article, since the mortar clinches sufficiently when the lath is fastened directly to studding or joists. Plaster is much easier placed upon ceilings or walls with this lath than with wire cloth, and very little labor is necessary in accomplishing the work. Much time is saved in plastering with the use of this lath, since in fair weather the second coat can be laid on a day after applying the first coat. A smaller quantity of mortar covers a greater space than when ordinary wire cloth is employed. The plastering is much stronger after setting, and the clinch is so direct that the walls and ceilings, it is claimed, will last as long as the building, unless violence is used to remove the plaster. The lath is claimed to be of great value in plastering outside walls of buildings, because of its stiffness and the superior clinch it affords. It may be used with cement mortar, thus securing a structure practically fire-proof at a moderate cost. A very elaborate machine has been produced for the manufacture of this lath, weighing no less than 18 tons. The first section into which the plain sheets of metal are introduced contains two sets of knives, each knife being from 2 to 8 inches long, as required by the size of mesh in the pattern, and each set having six to a dozen knives, according to the width of the sheet of metal. As the metal passes through this section it is cut by each set of knives alternately, so as to leave several rows of $\frac{1}{4}$ to 1 inch wide strips, the cuts or divisions of one row coming opposite the center of the strips of the adjoining rows. The metal then passes to the next section, which stamps a series of crimps across it. It then goes to a press, where by a series of movable dies, which can be adjusted to a very small space, the rows of strips are corrugated or alternately bent upward and outward; at the same time the spaces in the strips are widened so that they assume the shape of elongated diamonds. The strips, which before could be easily bent, are now, by their V-shaped form, greatly strenghthened. The advantages of this lath will be readily appreciated by our readers in general.

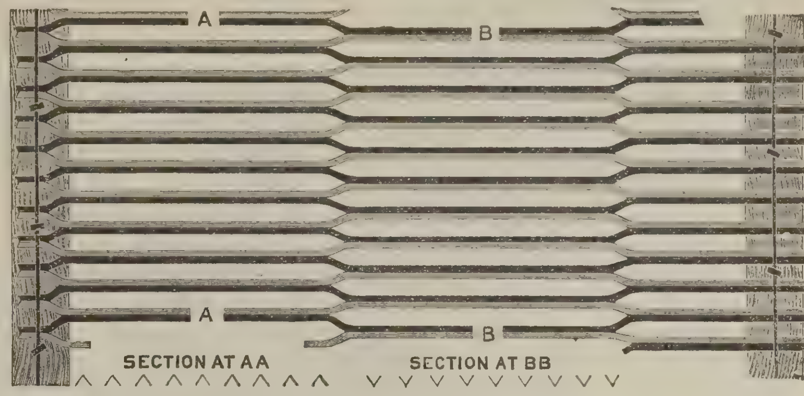


Fig. 5.—New Fire-Proof Sheet-Metal Lath.

The Safety Sash Lock.

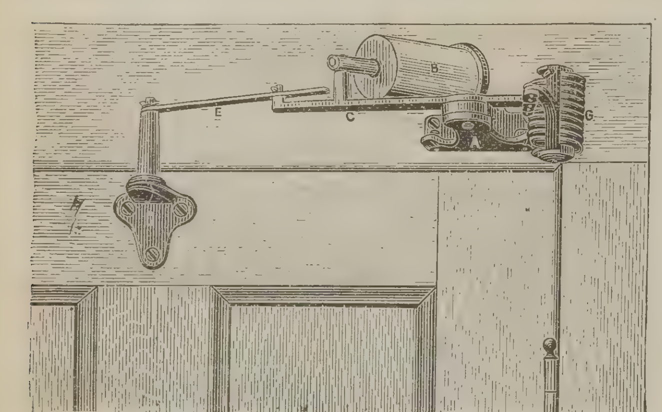
The Champion Safety Lock and Novelty Company, 106 and 108 Canal street, Cleveland, Ohio, are putting on the market a sash lock, represented in Fig. 6 of the engravings. This lock is simple in construction, and consists of a case with an eccentric cam having a handle to operate it, which is attached to the meeting rail of the lower sash, and the locking plate with a lip on its inside on the upper sash. Both case and locking plate have straight edges, so as to set flush with the


Fig. 6.—The Safety Sash Lock.

meeting edges of the respective rails. It is so constructed that when the eccentric cam is by its handle turned half way round it will engage the lip on the locking plate, and the motion of the handle being continued the sashes are locked tight together. The cam point is so constructed as to engage the locking plate, even if the upper sash is somewhat below its proper level, the rise of the cam gradually raising the sash as the cam is turned. The connection between the cam and the handle is made by a post formed on the handle and clenched so as to be flush with the bottom of the cam. The handle is furnished with or without an automatic latch, not represented in the cut, which gives security against its being opened from the outside. In alluding to the advantages possessed by this sash lock reference is made to its simplicity, cheapness, strength and safety, and the fact that it is not liable to get out of order.

The "Home" Combined Door Check and Spring.

The Russell & Erwin Mfg. Company, New Britain, Conn., with warerooms Nos. 43 to 47 Chambers street, New York, and 19 North Fifth street, Philadelphia, are putting upon the market a series of door checks and springs combined; also door check without springs, bearing the general term of "Home Door Checks." One of these is illustrated in Fig. 7 of the engravings. It represents the form of check and spring combined, adapted to attaching to a casing and door on the side where the door comes flush, or nearly flush, with the casing. By a modification of one or two minor parts the check is adapted for working upon the opposite side of the door. The check and spring in themselves are adapted for use on either right or left doors. By reference to the engraving it will be seen that the spring is spiral variety and is so arranged as to be in very compact form. An air cylinder serves as a cushion for receiving the thrust of the door in swinging, and by means of adjustments in the connecting lever between the pivot screwed to the door and the pivot to which the air piston is directly connected more or less of the force exerted by the spring is secured. In other words, an adjustment is provided adapting the spring for use on doors of different sizes. The construction of the device is such as to be self-contained and easily put in place. If the door be



Novelties.—Fig. 7.—The "Home" Combined Door Check and Spring.

swung beyond the center it is forced wide open and will stay in that position. In closing, the motion of the door through the larger portion of the arc is rapid until the air piston has an opportunity to exert its influence. It is then stopped without noise and allowed to close gently, and yet with sufficient force to throw the latch. The action of the spring is such that when the door is entirely shut it is exerted in the direction of holding it shut. This device is made in different sizes and adapted for use in different places. It is furnished in various styles of finish, adapting it for use in almost every conceivable place. A change from right to left is made within the article itself by simply shifting the bracket carrying the spring.

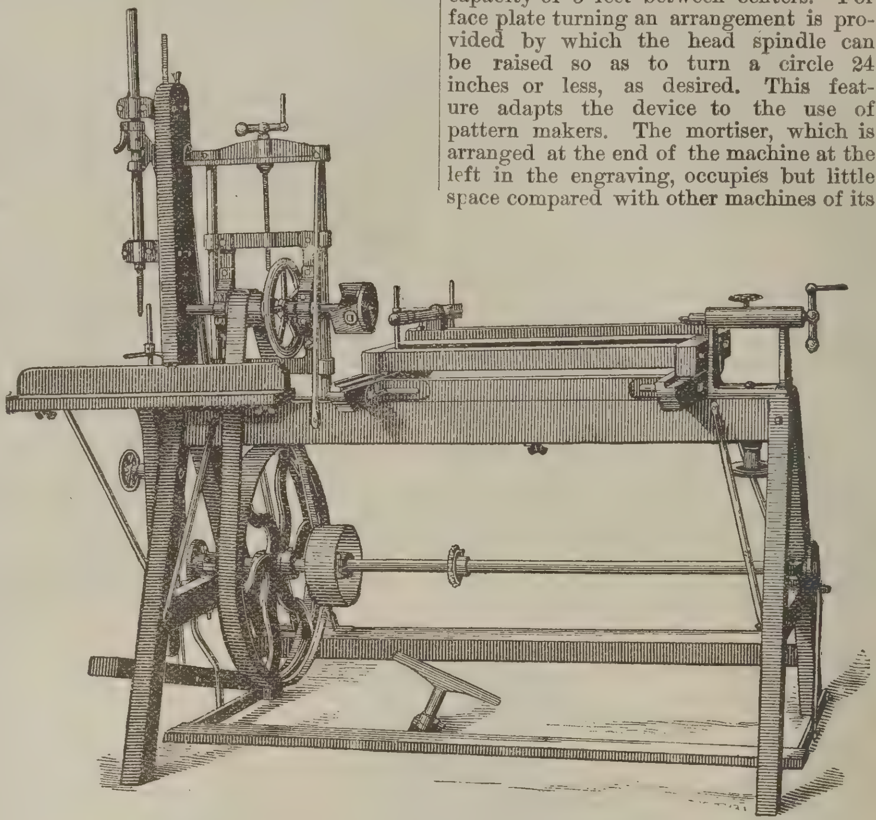


Fig. 8.—Combined Mortiser, Tenoner, Lathe and Planer.—Snedeker & Voorhees, Jamesburg, N. J.

Combined Mortiser, Lathe and Planer.

Snedeker & Voorhees, of Jamesburg, N. J., among other specialties of great interest to wood workers who are operating without steam power, are putting upon the market a combined mortiser, tenoner, lathe and planer, a view of which is presented in Fig. 8 of the engravings. This device, it is claimed by the makers, is constructed on new and improved principles, the different functions of the machine being independent of each other. The cut shows the machine arranged for operation by foot power; but it is so constructed as to admit of steam power being readily applied, if desired. As a tenoner, we are informed, it will cut any desired width or thickness of tenon. The hand screw is used to adjust the depth of cut. The makers assert that a tenon 1 inch or less in depth will be made as perfect with a single cut as any power machine can possibly do the work, and almost as quickly. The sliding table has an adjustable gauge for the purpose of regulating the distances between the shoulders; accordingly, any number can be cut without measuring. When the machine is used as a lathe the sliding table is removed and the guides are thrown back. Inasmuch as they are hinged to the back of the machine, they take an inclined position and are therefore entirely out of the way. The lathe has a capacity of 3 feet between centers. For face plate turning an arrangement is provided by which the head spindle can be raised so as to turn a circle 24 inches or less, as desired. This feature adapts the device to the use of pattern makers. The mortiser, which is arranged at the end of the machine at the left in the engraving, occupies but little space compared with other machines of its class. In the place of a wood spring, which is generally in the way, a little coiled spring underneath the column is employed. The table is arranged to raise and lower, and is secured and held in any desired position by a hand-wheel underneath the table. The chisel bar is reversible, so that both ends of the mortise can be squared. The attachment shown in Fig. 9 represents the planer part of the machine. It is an attachment that is placed crosswise of the bed of the machine

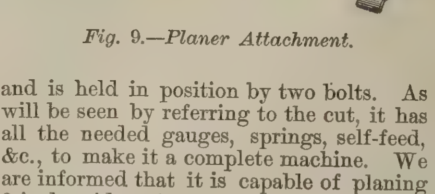


Fig. 9.—Planer Attachment.

and is held in position by two bolts. As will be seen by referring to the cut, it has all the needed gauges, springs, self-feed, &c., to make it a complete machine. We are informed that it is capable of planing 3-inch wide, also of plowing, rabbeting and working light moldings.

Adjustable Top Saw Table.

The machine shown in Fig. 10 of the engravings, manufactured by Goodell & Waters, Philadelphia, has been designed especially for the use of sash, door and blind shops, furniture making establishments and concerns producing moldings. It is useful wherever any accurate and reliable work is done. The mechanism of the machine throughout is simple and effective, and is easily understood by

operators. The table is 4 feet 4 inches long by 3 feet wide, and may be set at any angle by means of a hand-wheel located directly underneath the table. The method of raising and lowering the saw may be described as novel. The arbor frame slides in gibbed ways on the side of the machine and is operated by a hand-wheel placed near the wheel for adjusting the table, thus bringing both adjustments close together and in a very convenient position for the operator. The manufacturers consider this method of attaching the arbor far superior to the link in general use on machines of this class. They claim for it greater rigidity and less liability to tremble. A rip gauge of novel design adapted to be set in or out of line with the saw, also a miter and cross-cut gauge are furnished with the machine. The cross-cut gauge may be used on the right or left-hand side of the saw at option. The mandrel is fitted for 16-inch saw with ⅛-inch hole. The general features of the design are clearly shown in the engraving so as to need no further description.

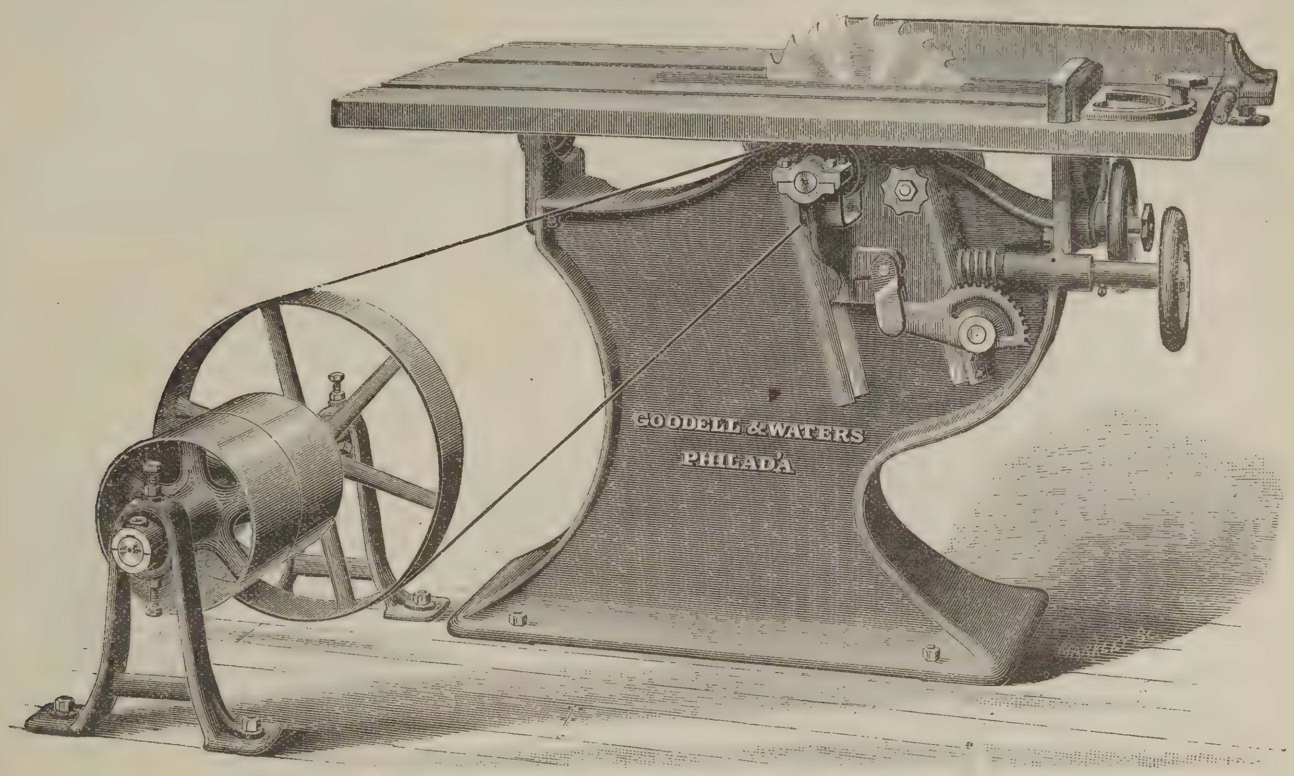


Fig. 10.—Adjustable Top Saw Table.—Built by Goodell & Waters, Philadelphia.

The Crenelated Square.

A novelty in steel squares is just being introduced by the Peck, Stow & Wilcox Company, No. 27 Chambers street, New York. It is illustrated in Fig. 11 of the engravings. The article is the invention of a practical carpenter, and represents the result of long experience and careful study. The device has been suggested for rapidly laying off a frame of a building or of any timber work. One application of the square is indicated in the cut. The tongue, it will be noticed, is notched to correspond to the ½-inch spaces. Accordingly, used as shown in the engraving with a pencil or scratch awl in the proper places, the laying off of tenons and other shapes is rapidly accomplished. This will be understood by a brief reference to the directions. Take the square in the left hand and lay the tongue upon the surface to be marked—say for a tenon or mortise—lower the end of the main arm of the square next the person—say 2 or 3 inches from the upper surface. Place the awl, held in the right hand, in the notch designating the distance desired for the tenon or mortise from the outer surface. Press the square against the timber, and with one movement the mark is made. Replace the square as before, and place the awl in the notch desired for the width, and again mark, as described. For the mortise, replace again, and locate the awl in a notch equidistant from the marks already made, and again mark as a guide for the auger, thus doing away with witness marks. In using a pencil it is necessary to move the square backward a trifle before moving the right hand, in order to avoid breaking the pencil. These same rules apply to the use of the square in marking on the sides of timbers or overhead, and the square may be used either right or left. It is claimed that with the use of this square a workman can do twice the amount of marking in a given length of time. Turning the timber is nearly dispensed with, since it is possible to mark equally well either on the side or overhead, however it may be required. If the timber is icy or cross grained, if the eyesight is defective or the light poor, very little inconvenience will be suffered by those using this square. The makers further point out that it may be used in cold weather, even when gloves or mittens on the hands are necessary. They also direct attention to the fact that there is less liability to mistakes, since it is possible to mark three sides of the timber without turning. The free use of both hands is secured by means of this tool, and one mark is made better and plainer than three in the ordinary way. It is also asserted that the wrist never becomes tired or lame. Still other advantages are claimed to follow the use of this device, which will be readily perceived by the practical builder without further description.

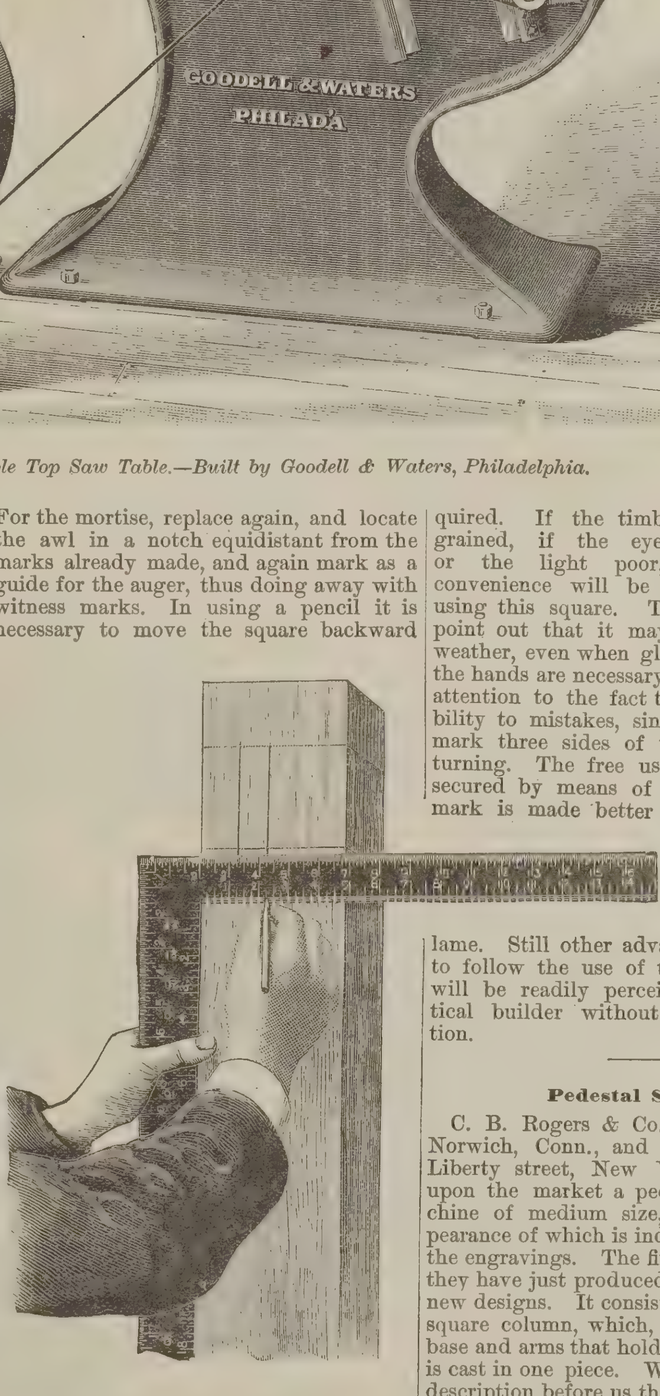
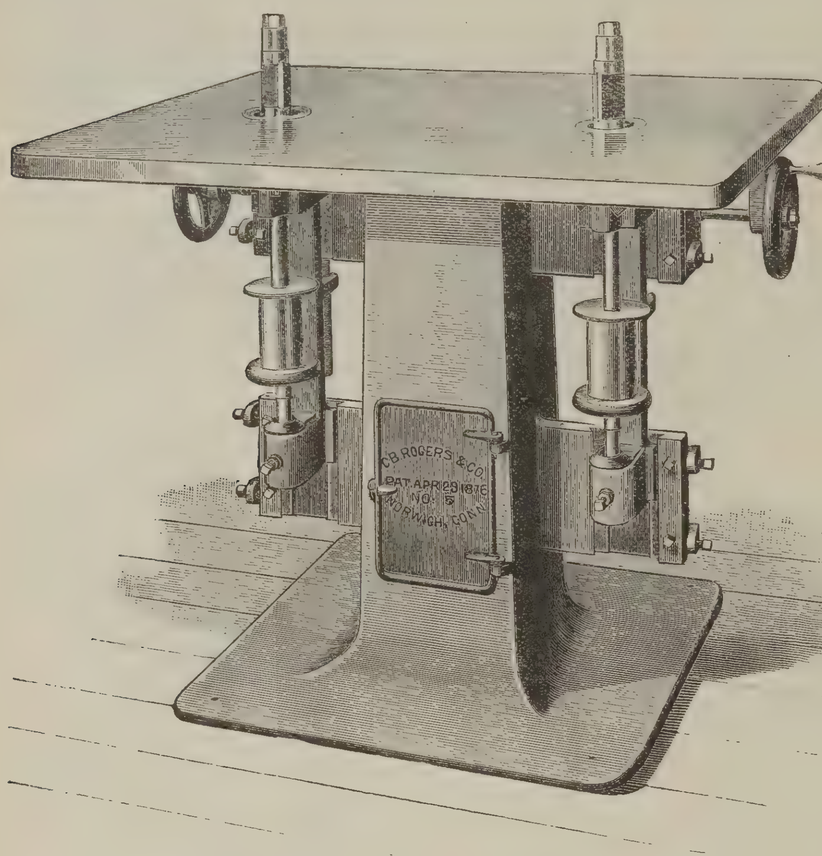


Fig. 11.—The Crenelated Square.

Pedestal Shaper.

C. B. Rogers & Co., with factory at Norwich, Conn., and warerooms at 109 Liberty street, New York, are putting upon the market a pedestal shaping machine of medium size, the general appearance of which is indicated in Fig. 12 of the engravings. The firm inform us that they have just produced this machine from new designs. It consists of a substantial square column, which, together with the base and arms that hold the spindle yokes, is cast in one piece. We learn from the description before us that the spindles are of steel, 1 inch in diameter above the table, and are placed 22 inches apart. They are run in boxes connected by a yoke, so as to keep them perfectly in line. Both boxes are self-oiling, and the lower step has a large oil chamber with a take-up tap in which the spindle runs, an arrangement which, we are informed, renders heating

impossible when oil is in the chamber. The spindles are raised and lowered by the hand wheels in front, which are within easy reach of the operator. They can be run below the top of the table. The table top is of iron, 3½ feet square, and is constructed with rings around the spindles to change the size of the openings. In the column of the machine there is provided a convenient tool chest.



Novelties.—Fig. 12.—Pedestal Shaper.—C. B. Rogers & Co., Norwich, Conn.

Becker's Interchangeable Mechanical Check.

John G. Witte & Brother, No. 75 Chambers street, New York, are directing the attention of the trade to a new door spring and mechanical check, known as "Becker's." It is illustrated in Fig. 13 of the engravings. Among the leading advantages claimed for this device may be mentioned that it is strictly mechanical; that all its parts are interchangeable, and that it is made wholly of steel, and, therefore, is strong and durable. The device in actual use appears less complicated than would be gained from the engraving presented herewith. A slight change has been made since the cut we used was prepared. In the place of the spring and the reinforcing coil, shown at P in the engraving, a solid block of wood is employed, practice having shown that a spring was not necessary for the recoil at this point. The door is drawn shut through the larger portion of its arc by the long coil spring shown at the top of the engraving. As it approaches within a few inches of being shut, the point L of the hook-shaped part passes underneath the roller R, being at the same time tripped so as to bring in force the coiled spring M, shown at the bottom of the cut. This has the effect to give the door increased momentum and bring against the part P the cam-shaped buffer C. This receives the momentum of the door and allows it to close gradually and yet positively. There are no air cushions, cylinders or valves employed in this device, and sufficient adjustments are provided to allow for any taking up that may be necessary owing to peculiarities of situation. The spring power is counterbalanced by leverage, thereby securing the greatest force when the door nears the closing point, and, on the other hand, the resistance decreases as the door is opened. Three sizes are manufactured. One of these is especially adapted for front doors of flat houses, for which, it is stated that it will actually close the door and again throw it out of latch the moment the latter is released through electric or other means. This very important feature, it is claimed, has never been attained by any other combined door-check and spring.

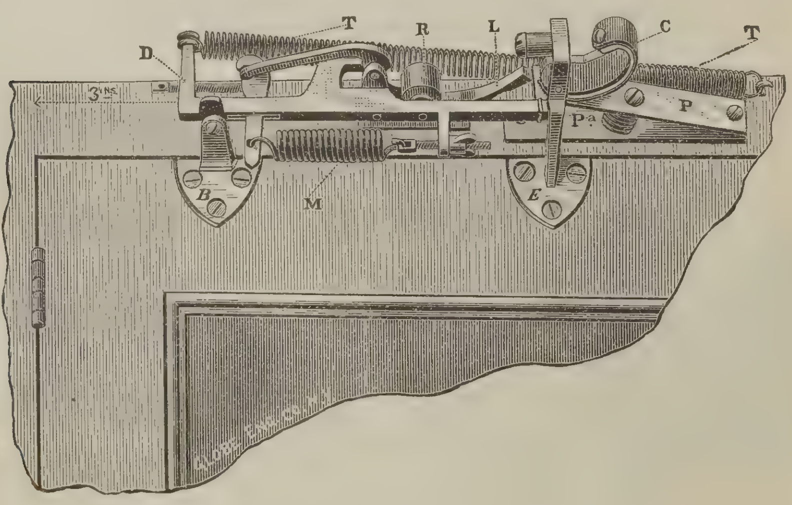


Fig. 13.—Becker's Interchangeable Door Spring and Check.

Combination Dado Saw Head.

The Fox Machine Company, Nos. 4 to 8 Erie street, Grand Rapids, Mich., are directing attention to the combination dado or grooving saw head illustrated in Figs. 14 and 15 of the engravings. Two forms of the device are made, one being solid, Fig. 14, and the other adjustable, Fig. 15, and both consisting entirely of saws. The two outside saws shown in the engravings determine the width of the cut. These, it is claimed, have seven times the cutting surface of any spur or knife dado head; consequently a larger amount of work is secured while retaining universal width of cut. The center saw removes the intervening stock projecting over the outside saws; these admit of being worn down from 1 inch to 3 inches. It will be noticed that four saws are employed. One straight and one wabble saw is firmly attached to each collar by male and female screws. One collar has a right-hand thread and the other a left-hand thread. The screw or

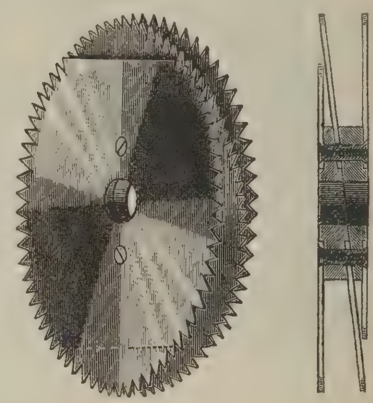


Fig. 14.—Non-adjustable Dado Head.

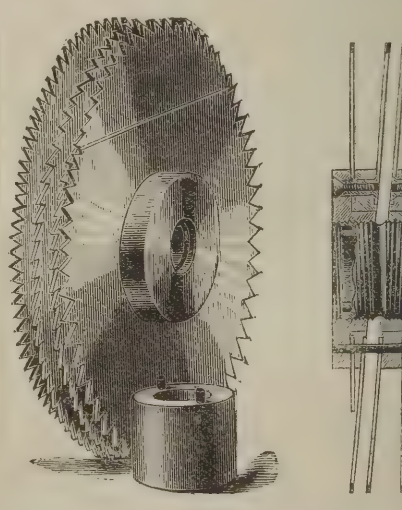
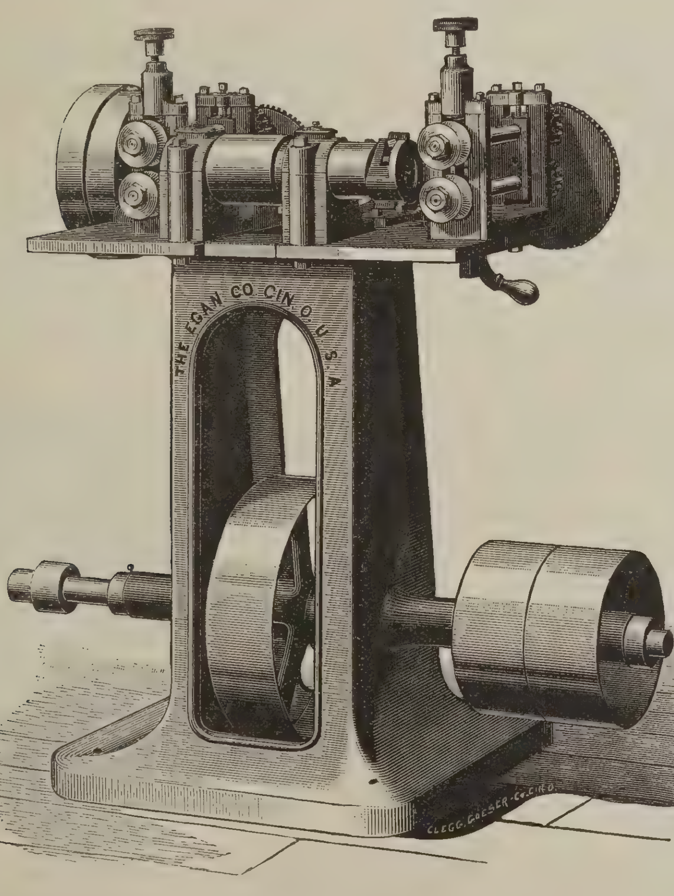


Fig. 15.—Adjustable Dado Head.—Fox Machine Company, Grand Rapids, Mich.

bushing has threads corresponding. The adjustment is effected by inserting the pin-wrench into the end of the bushing, which is broken away in the cut in order to show the holes, turning it to the right for a wide cut and to the left for a narrow cut. Then when the chambered collar has been replaced and the saw arbor nut screwed up it clamps the whole firmly together. The pin which is fast in one collar holds the parts in position. All this, the makers point out, is accomplished in a very brief space of time.

Power Feed Rod, Pin and Dowel Machine.

Fig. 16 of the engravings shows a very solidly built machine for making rods, pins and dowels which is being put upon the market by the Egan Company, of Cincinnati, Ohio. There is a need for large quantities of this kind in planing mills, furniture factories and in many other wood-working establishments, and hence there is a large demand for a good machine of the class here shown. As will be seen by the cut, the iron frame is cast in one piece and cored, forming a hollow column. It is provided with a wide base, giving a firm bearing on the floor. There are four geared feed rolls, two feeding in with angles on their face to suit square stock, and two feeding out with grooves in their face to suit turned stock. The frame carrying the several rolls is hinged to the column, so that the rolls can be swung to one side in order to change the heads and chucks when desired. The front rolls are given tension by springs so as to conform to any angularity of the stock. A hollow mandrel runs between long bearings, and has ample belt power to turn rods from any stock, either green or dry.



Novelties.—Fig. 16.—New Rod, Pin and Dowel Machine.—The Egan Company, Cincinnati.

New Variety Molder and Shaper.

In Fig. 17 there is shown a new upright molder or friezer, just brought out by Frank H. Clement, 222 Mill street Rochester, N. Y. This machine is described by the maker as an extra heavy, finely designed and carefully fitted machine; something that will suit a critical operator who wants a good, durable and convenient tool and one that can be depended upon for fine and fast work. The maker informs us that great pains have been taken with all the working parts to prevent lost motion, heating of the journals and vibration of the spindles. Among the many good points which he draws special attention to are long bearings of the spindles, the upper one being close to the top of the table; self-oiling boxes covered from dust; large table surface; convenient and sure means of adjusting the spindles vertically; breadth and solidity of attachment of spindle yokes to the frame; large openings in the table around the spindles, into which rings are fitted for various sizes of collars. The maker states that the spindles can be made entire or with independent top sections, as wanted. The table may be of wood or iron, and collars of any diameter up to 4 or 5 inches may be run on the spindles. Eight collars, we are informed, are usually supplied with the machine.

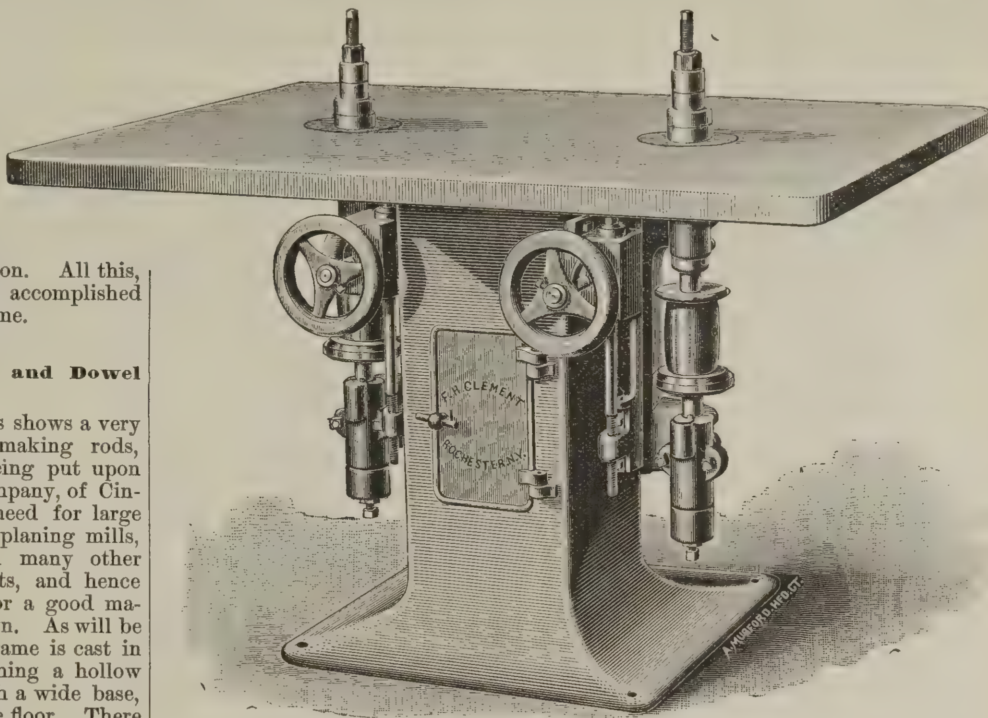


Fig. 17.—New Variety Molder and Shaper.—F. R. Clement, Rochester, N. Y.

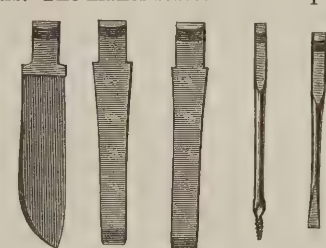


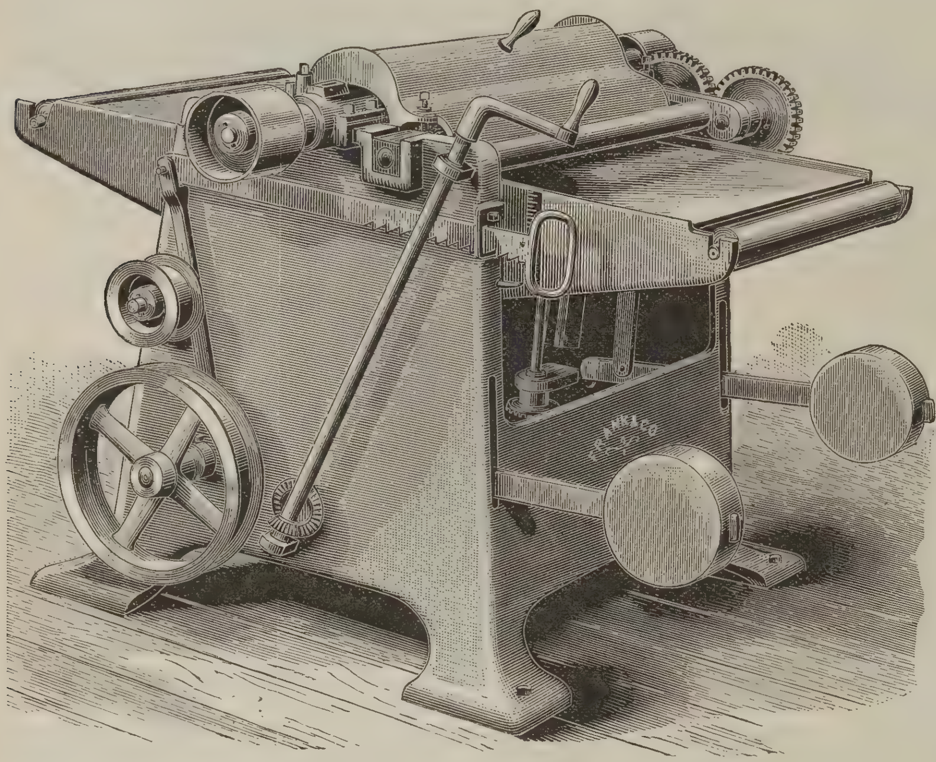
Fig. 18.—Tools Included in the New Pocket Tool Holder.

A New Pocket Tool Holder.

C. E. Jennings & Co., Nos. 79 and 81 Reade street, New York, are just putting upon the market a pocket tool holder that is undoubtedly of interest to a large class among our readers. The device in its general appearance when closed, in some respects, resembles an ordinary pocket knife; it exceeds in size what would be called a pen knife and may be compared to the useful "Barlows" which were very popular some years since. Inside of the

Fig. 19.—New Pocket Tool Holder.—The Handle.

case afforded by this form of handle are five useful tools, large and strong enough for service and adapted to be firmly held when in use and also to be readily changed, one for the other. One of the cuts presented herewith, Fig. 19, shows the handle with the lid swung round, as would be necessary for removing the tools from their resting place. The first engraving, Fig. 18, shows the tools in detail. These, it will be seen, consist of a gimlet bit, a screw driver, an awl, a chisel and a knife blade. Each of these tools is nicked in the shank and is adapted to be fitted into a socket in the end of the handle. The cover as it swings around locks the tool in place by means of the groove already referred to. The tools are very firmly held and the handle large enough to afford a good grip in use. The handle is made of malleable iron, nickel-plated, while the tools are of a good quality of steel.



Novelties.—Fig. 20.—Cabinet-Maker's Planer.

Cabinet-Maker's Planer.

Frank & Co., 176 Terrace street, Buffalo, N. Y., inform us that they have ready for the market the new machine shown in Fig. 20 of the engravings. It is intended for cabinet-maker's use, particularly for doing extra smooth work. The makers point out that it has long and heavy bearings and is adapted to all kinds of surface planing. In capacity the machine will plane 26 inches wide and 8 inches thick. The feed rolls are 3 inches in diameter and are heavily geared. The feed in roll has weighted pressure; the out-feeding roll rubber spring pressure. The latter has a covering to keep off dust and shavings. Pressure bars are located at each side of the cylinder. The one in front is lifted by the bearings of the feed roller, giving it always the same relation to the lumber, whether a light or heavy cut is being taken. The pressure bar, after the cut, is adjustable. Both pressures come very close to the cutters, to admit of planing very thin or short pieces without chipping. The makers inform us that the cylinder shaft is made of a fine quality of hammered crucible steel. There is a steel chip-breaker made from fine tool steel under the cutter to prevent tearing cross-grained lumber. The cylinder is driven by a pulley on each end. The bed has four friction rollers. The bed is extra heavy and is gibbed. It is raised and lowered for planing to the thickness of lumber by convenient means. An index is provided to show thickness. The weight of the machine is given as a little less than 1 ton.

Adjustable Window Screen.

Fig. 21 of the illustrations represents the general appearance of an adjustable window screen which W. J. Clark & Co., of Salem, Ohio, have just ready for the market. In the cut two views are presented; the full view represents the front of the screen with the right wing extended, and the smaller view at the side represents a back view of that part of the screen having the wing extended. The adjustability of the screen is restricted to dimensions governed by the amount of slide given to the wings. How these are arranged is easily seen from the engraving. The construction admits of the screen being made in large quantities, sold through the trade and readily fitted into windows of varying dimensions. In addition to these special features Messrs. W. J. Clark & Co. direct attention to the mode of attaching the wire cloth. The plan that they are employing in this respect on this movable or adjustable screen is the same as they have successfully used for some time past in their screens of fixed dimensions. A groove is cut into the frame in such a way as to have no liability of weakening it and into this groove the raw edge of the wire cloth is forced. The space is then filled with a bead neatly bradded in place, making the finish almost flush with the frame and successfully covering up any ragged edges that might otherwise exist. We understand that it is a novelty in having wire fastened in this manner in screens that are adjustable. The firm inform us that the screens are made of clear, dry whitewood $\frac{7}{8}$ inch thick, mortised and tenoned together. They employ double selvage wire cloth, stretched by the peculiar construction above described drum-head tight. The mode of attaching the wire mentioned stretches it evenly and fastens every thread, making it strong enough to withstand the misuse or accidents which tear out or leave the cloth flabby, when attached in the ordinary way by tacks with moldings over them.

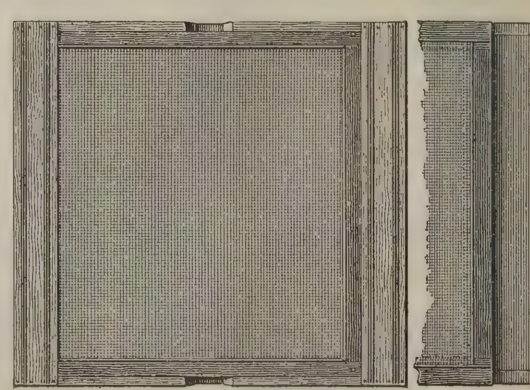
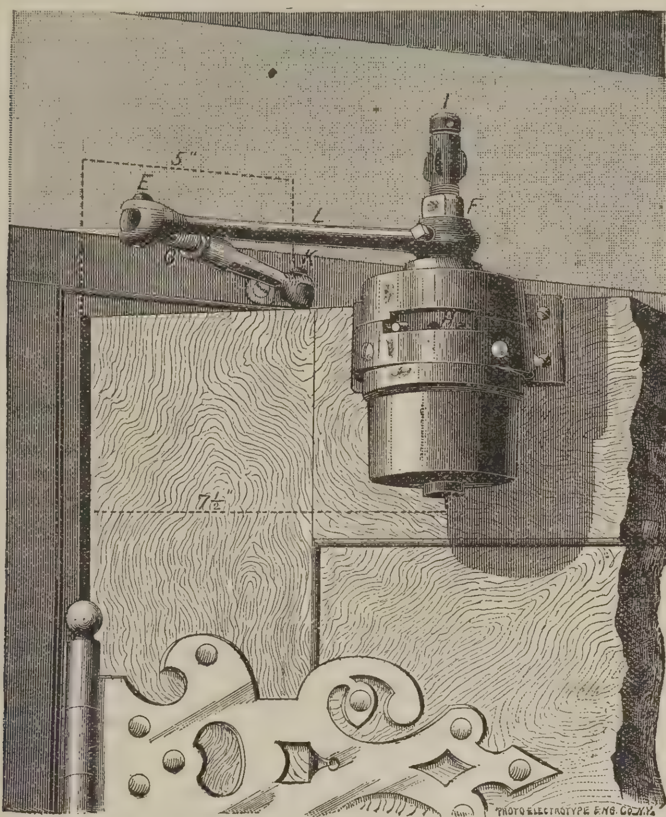


Fig. 21.—Clark's Adjustable Window Screen.

The "House" Patent Automatic Liquid Door-Check and Spring.

E. E. Graves, Bridgeport, Conn., whose liquid door-check, intended especially for screen and inside doors, we have already described, is manufacturing the door-check and spring named above, and illustrated in Fig. 22 of the engravings. Its object and special features are indicated in the name and its construction and operation shown in the cut. As there indicated, it consists of a case which contains a central spindle, which in opening the door is turned in the manner shown, there being within the case a coiled spring so connected with the spindle and with the case that the turning of the spindle compresses the spring, thus securing the force by which the door is closed. In order to prevent a too sudden closing, and the consequent banging of the door, resistance is afforded by means of a liquid used within the case, this liquid being acted upon by a piston put in motion by the turning of the spindle, and caused to pass through a contracted opening by the movement of the piston, in such a way as to check the closing of the door, which is, however, accomplished by the action of the spring. The spring is referred to as so placed as to make it the strongest at the closing point, the resistance gradually decreasing as the door is opened, thus allowing doors of large size to be opened with comparatively little exertion. The check is so arranged that when the door is almost closed and ready to latch it ceases to offer resistance, and allows the spring to use its full force in latching the door, so that as the door closes it is at all points, except at the latching point, under the control of the check, which prevents the door from closing part way with a rush, as in the case of other checks. In order to counterbalance the effect which heat or cold may have on the liquid which is used, there is a regulating rod that controls the oil passage. It is described as made of a metal very sensitive to heat and cold, thus giving the liquid a larger aperture in cold than in warm weather, thus permitting the door to close more quickly. By screwing the rod up or down, any de-

sired speed may be obtained, thus leaving the rapidity of the action of the check to be determined as desired. These door checks are entirely metallic, and alluded to as practically indestructible, as the working parts are submerged in oil. The following points are also made in regard to them: That there are no small springs, leather washers or packing to get out of order; that the spring is made from the finest tempered steel, flat and wound like a clock spring; that the material and workmanship are the best and the finish artistic; that they can be placed either on the door or on the jamb, and on either right or left hand door; that the arrangement of the check permits the door to be opened back to the wall, and when desired the check will hold the door in this position; that they are very easily applied and adjusted, and exceedingly durable, and that they are offered at a very low price. These checks are made in the following styles of finish: Japanned nickel trimmed, full nickel, japanned bronze trimmed, full bronze and solid bronze.



Novelties.—Fig. 22.—The House Liquid Door Check.

The Moody Steel Anti-Friction Barn Door Hanger and Rail.

This article, the invention of Mr. Moody, of the Victor Mfg. Company, Newburyport, Mass., by whom it is manufactured, is illustrated in Fig. 23, given herewith. It will be seen that it belongs to the class of hangers designed to run on the edge of iron when either attached to the beam over the door or to brackets. The hanger frame is described as made entirely of steel, and the wheel has a steel axle. It is alluded to as strong, simple and easily applied, and may be used as a sheave for the bottom of the door if desired. The special features of novelty are, however, in the rail, which has in combination with its brackets a positive lock joint to prevent the rail from getting out of line, either on its horizontal or lateral plane. The slot-hole bracket permits two lengths to be bolted to it, thus forming a perfect straight line, and the point is made that with this construction there is no possibility of displacement, a result that is not assured where rails attached to separate brackets abut. In attaching the brackets are put up 1 foot apart on centers when the rail is put up in place, the rail being secured to the bracket by $\frac{3}{8}$ x $\frac{1}{2}$ inch bolts. The slot-hole in the bracket allows, it will be perceived, a range of adjustment. This hanger and rail are put on the market to meet a demand for a bracket track hanger of moderate cost, but they are not recommended by the company as highly as their well-known Victor hanger and rail. Information in regard to the prices is given in the Trade Report.

Early Large Timber Rafts.

In an article entitled "The Nova Scotia Raft and Its Progenitors," the *Timber Trades Journal* refers in the following interesting manner to early large timber rafts:

In 1792 a raft containing about 1000 tons of timber was built at Swan Island, in the Kennebec, by Dr. Tupper, a somewhat noted eccentric character. It was made by tree-nailing square timber together in the form of a ship's hull, and was ship-rigged, the intention being to send her across to England. At that time no manufactured lumber was admitted to the ports of Great Britain; hence the timber in the raft was simply squared with the axe, to make it stow well. The ship or raft lay at Bath for some time, it being difficult to get men to go in her. She finally went to sea, however, carrying a small vessel on her deck. But off the Labrador coast her crew became frightened by bad weather and abandoned her. She was afterward boarded by men from a passing vessel and found to be in good order, and it was suspected that she was deserted without sufficient cause. Two other similar attempts were made from the Kennebec, and both vessels went safely across, but foundered on the English coast, under the same suspicions of fraud as in the case of the Tupper ship. In 1825 the ship Baron of Renfrew was launched at Quebec, having made a previous unsuccessful attempt, when stopped on her way, owing to the grease being consumed by fire from friction. She was towed down to the Island of Orleans and anchored. Her dimensions are given as follows: Length, 309 feet; breadth, 60 feet; depth, 38 internally and 57 externally; tonnage, 5888 tons; draft when launched, 24 feet; cargo on board when launched, 4000 tons of timber. She was ship-rigged, with four masts, and was perfectly flat-bottom, with a keel of about 12 inches, wall-sided, sharp forward and rather lean aft, and looked more like a block of buildings than a ship. She sailed in August, 1825, drawing 36 feet of water, in command of a Scotchman, a half-pay lieutenant in the British navy. October 27 the Baron of Renfrew drove on shore on the coast of France, near Calais, and went to pieces.

We learn from Messrs. E. Van Noorden & Co., of Boston, that they have contracted with the city authorities of Charleston, S. C., for some very important hospital work, constructed upon a novel plan. The work is to line the walls of four wooden hospital wards on the inside with one-quarter inch glass set in angle-iron frames held in place with galvanized sheet-iron caps. The ceilings, which are arched to a radius of 24 feet, are to be finished in fine corrugated iron. The wards are 30 feet wide by 112 feet long, and are in one-story buildings covered with double-pitched roofs. The idea of using glass, as above described, is to prevent the absorption of disease germs. We understand that this is an entirely new departure, and that the completion of the work will be watched with much interest by those whose attention has been called to it.

Several large structures are about to be erected in Philadelphia, among them the Girard Life Insurance Building, with a stone front 100 feet on Chestnut street, will be eight stories high, of fire-proof materials throughout; the corner tower will be 180 feet to the apex; J. E. & A. L. Pennock are the contractors. Plans for Wm. M. Singerly's buildings on Chestnut street provide for a front of red granite and Indiana limestone, rock faced. The entire structure will be fire-proof and cost $300,000.

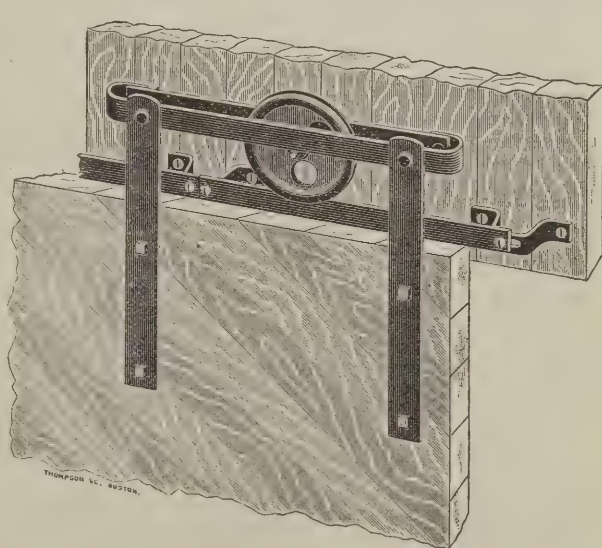


Fig. 23.—Moody Steel Anti-Friction Barn Door Hanger and Rail.

TRADE NOTES.

Benjamin H. Shoemaker, 205 to 211 North Fourth street, Philadelphia, has issued a little pamphlet devoted to American and French window glass, including engraved and enameled, ornamented and etched, and other varieties of glass. The pamphlet contains many items of information that are of interest to builders and architects, including a number of illustrations of ornamental patterns. Many of the designs are priced.

F. W. Bird & Son, East Walpole, Mass., direct attention in another part of this issue to the Neponset Rope Roofing Paper, which is claimed to be a tough water-proof and durable material, which is already known to many of our readers. Wholesale agents in different parts of the country are mentioned, with their addresses, where specimens may be seen.

The J. F. Pease Furnace Company, with general offices at Syracuse, N. Y., and Toronto, Ont., direct attention in this issue to the removal of their Boston office from 112 Portland street to 75 Union street. This company is making combination steam and warm-air heaters and a specialty in warm-air furnaces.

The Gilbert Lock Company, 136 Front street, Newark, N. J., invite our readers to send for prices on their door-knob and handle furniture, constructed upon new and improved ideas.

The Thompson Mfg. Company, Cleveland, Ohio, with great fairness claim to have the finest catalogue ever issued by a roofing company. It is a handsomely illustrated and finely printed pamphlet of nearly 100 pages. In their card, which appears in another part of this issue, they state to the trade that they desire to mail this book to every applicant. Our readers generally will be interested in this offer. Holbrook, Merrill & Stetson, of San Francisco and Sacramento, Cal., are sole agents for the roofing materials manufactured by this company for the Pacific Coast.

J. E. Bolles & Co., of Detroit, Mich., call attention in their card in another part of this issue to their Iron Stairs, Iron Balconies and other work in the way of builders' supplies. They have an illustrated catalogue, which is sent to all applicants.

The Seneca Falls Mfg. Company, Seneca Falls, N. Y., direct attention in their card in this issue to a scroll-saw attachment applicable to some of their standard machines. This company are building up an enviable business in foot-power machinery and other specialties.

Those who have occasion to bore holes in difficult places, as, for example, in the corners of a room or in box-shaped structures, will be interested in the corner brace which Amidon & Bastedo, of Buffalo, N. Y., are putting upon the market. The firm also make several other specialties.

R. B. Hugunin W. F. Mfg. Company, Hartford, Conn., refer in their card in this issue to an adjustable patent screw-sash balance which they are introducing, which is in effect a mechanical substitute for sash weights for medium and light sash. Several sizes and styles are manufactured.

The Simonds Mfg. Company, Fitchburg, Mass., and Chicago, Ill., call attention in another part of this issue to the four gold medals awarded their productions at the New Orleans Exposition. Saws of various kinds and Planer Knives are leading specialties.

We have received from Henry Disston & Sons, Philadelphia, Pa., a copy of their new hand-book for lumbermen, in which there appears a treatise on the "Construction of Saws and How to Keep Them in Order." The volume before us, which is a pamphlet of nearly 100 pages, is entitled "Part I," and has a very attractive list of contents. It is something that every reader of this journal will be interested in examining. The treatise on "How to Keep Saws in Order" presents in a very satisfactory manner the principles which underlie correct filing.

The Charles W. Spurr Company, 465 East Tenth street, New York, vary their advertisement of wood carvings this month by a change in the illustration in their card. Their new catalogue and price-list is of interest to all our readers.

The E. Walker Tool Company, Erie, Pa., in another part of this issue present cuts of several of their specialties, including Walker's Adjustable Face Plane, Walker's Handled Chisels and Gouges and Walker's Micrometer Marking Gauge. Circulars and catalogues are sent to all applicants.

It would seem that the offer made by Berry Brothers, with general office in Detroit, Mich., and branch offices in all the leading cities, concerning their hard-oil finish, leaves practically nothing to be desired upon the part of architect, builder, painter or house owner when determining the expediency of using this material. The samples which are offered and the correspondence that is invited are of interest to all our readers.

At the National Builders' Convention, at Cincinnati, Ohio, a few weeks since, Mr. Edward E. Scribner delivered an address on "Roofing." In the course of his remarks he referred to the success attending the use of Trinidad asphaltum roofs, and the lack of success following the use of other roofs under the trying climatic conditions prevailing in the Northwest. He made special reference to the roofing furnished by the Warren Chemical and Mfg. Company, 114 John street, New York, of which he has been a successful user for some years past. The card of the company appears in another part of this issue.

Many of our readers are already acquainted with Morton's Metal Cable and Champion Sash Chains as substitutes for sash cords. Attention is directed to these goods in another part of this issue, and late improved attachments are mentioned. Some letters of testimonials are also presented.

I. P. Frink, the well-known reflector manufacturer, of 551 Pearl street, New York, sends us a copy of a testimonial recently received by him from the Building Committee of the Trumbull Avenue (Detroit) Presbyterian Church, expressing the satisfaction felt with the reflecting chandelier which was recently supplied to this church. The testimonial states that the auditorium is elegantly lighted up in every part and that the appearance of the hanging chandelier adds greatly to the finish and beauty of the interior. It concludes with the statement that the congregation are greatly pleased with both the finish and workmanship of the chandelier and also its lighting capacity.

Levi Houston, Montgomery, Pa., is calling attention to a line of wood working machinery, including various specialties and staple machines adapted for the general requirements of the building trades. He invites the readers of this journal to send for circulars.

The Progressive Engine and Machine Works, Summerfield, Md., assert that pure water, and plenty of it, can be obtained free of cost and without labor, and with scarcely any attention, by the use of the Kirkwood Wind Engine, which they are manufacturing. They offer a catalogue in the way of explanation of these claims.

The Glen Cove Machine Company, Limited, Nos. 24 to 30 Clay street, Brooklyn, N. Y., have recently added very materially to their works, tending to increased capacity both in the room to be occupied and also in the facilities for manufacturing. One new shop and new offices are among the improvements, and in the way of tools a large iron planer weighing 22,000 pounds is a conspicuous feature. The net result is more than doubling the capacity of the works. The company took this step in response to the active demand for their wood-working machinery. They inform us that they were behind orders all last season, but hope by aid of the increased facilities thus obtained they will be able to supply machines promptly during the present season.

We are in receipt of a pamphlet of testimonials issued by S. Bowen's Sons, Philadelphia, successors to the Pecora Paint Company, giving the features and advantages of the Iron Stove Cement which they manufacture. The pages of the pamphlet are reduced *fac similes* of letters received from a large number of firms who have used this material.

We have received from the Western Pennsylvania Association of Architects, with headquarters at 711 Penn Building, Pittsburgh, Pa., a copy of the constitution and by-laws, and list of the officers, as follows: President, Andrew Peebles; vice-president, George S. Orth; secretary, L. O. Dause, and treasurer, Joseph Anglin. We understand that it is the intention of this association to maintain a reading-room.

We have received a copy of the new edition of the quarto pamphlet issued by the Peerless Brick Company, Philadelphia, containing diagrams of molded and ornamental and colored brick of their manufacture. It is a book of great interest to builders and architects, and contains designs and specimens of construction that are useful to all who have the designing of buildings or the buying of material. Two pages at the close of the book are devoted to illustrations that originally appeared in our columns, being the main doorway of the Morse Building, corner of Nassau and Beekman streets, New York, and also of various details of the Morse Building, drawn to scale of ¼-inch to the foot.

The Gurney Hot Water Heater Company, No. 237 Franklin street, Boston, Mass., have sent us a copy of their new pamphlet which they have issued, entitled "Hot Water Heating." The book illustrates the system of heating for dwellings, offices, public buildings, conservatories, &c. The question of heating by this means is discussed in detail in the first part of the book, after which the apparatus manufactured by this company is introduced by means of carefully prepared engravings. Directions are presented for managing the apparatus, and different kinds of radiating surfaces are illustrated and described. The book is handsomely gotten up and is attractive to the eye as well as valuable on account of the information that it contains.

A very attractive catalogue describing inside sliding blinds and improved Venetian blinds has just been issued by the Venetian Blind Company, of Burlington, Vt. It is an octavo pamphlet of upward of 50 pages, printed on excellent paper, with numerous illustrations showing the special features of the productions of this establishment. At the outset inside blinds are described and the special advantages of Hill's inside sliding blinds are presented. A view is then introduced showing sliding blinds and screens and Venetian blinds as they would appear in a room in a dwelling. Following are some diagrams showing the patented feature of these blinds and then, in course, are illustrations of the different classes in which the blinds are manufactured. One of these shows the blinds in ordinary position; another shows a construction with pocket at bottom of window, and a third shows the blind going clear to the floor in front of the panel back at the bottom of the window. Following this are full size details, being adapted to the use of architects in arranging their drawings for these goods under different conditions. One shows a window frame of a frame house arranged for the use of sliding blinds; another shows the method of combining the blinds with a wire screen; a third, the method of arranging the window frame of any house having wide window jambs, and a fourth a method of applying the sliding grooves to window of frame house already built. Views introduced at this point of the catalogue relate to Venetian blinds, all of which are of interest to our readers. Sliding window screens are likewise presented. The latter part of the book is devoted to testimonials from many who have employed these goods and they are interspersed with views of buildings in almost every part of the country in which the blinds have been used. The book is one which every reader of this paper should possess, and we understand that the company are prepared to send it to all applicants.

The Silsby Mfg. Company, Seneca Falls, N. Y., present in another part of this issue a cut of the portable steam heater which they are manufacturing, and refer to the special features which recommend it to the attention of the building trades.

The catalogue of the Vassar Burglar Alarm Company, 853 Broadway, New York, contains illustrations and descriptions of a line of goods interesting alike to architects and builders. Copies, we understand, are being sent to all applicants.

Swarthmore College, located a short distance from Philadelphia, and which is prominent among those private institutions in the country affording young men a practical course in manual training and in the trades, has recently been made the recipient of a most generous gift. The sons of the late Edward Stabler, of Sandy Spring, Md., have presented to the institution the foundry of their father with all its appliances and patterns. In this foundry was cast all the metal work of the presses and seals made by him for the various State and city Governments, corporations and courts of law throughout the country; for the several departments of the National Government at Washington, and for its Consular agents all over the world. Here, too, were made the steel dies for the gold and silver medals of the Maryland Institute, and many other works of a similar character. This valuable gift will become a part of the foundry of the department of engineering and the mechanics art at the college, and will add largely to the means of instruction in this direction.

Our readers will recognize the name of A. S. Jennings, who has been an occasional contributor to our columns for some time past. Quite recently he lectured before the Y. M. C. A. of Salem, Ohio, on the subject of "Mechanical Drawing and Its Uses to Artisans and Mechanics." The lecture was well attended and was listened to with much interest by the audience. The speaker gave very careful directions for acquiring proficiency in the art, and dwelt with considerable care upon the advantages attending the acquirement of facility in draftmanship.

We have received from the National Building Plan Association, of Detroit, Mich., a copy of the new edition of their book entitled "Artistic Homes." The volume is an enlargement of the work which we noticed in these columns some time since, and contains much that is of interest to the householder who contemplates erecting a new home. Some 44 designs are presented, and the book is bound up in handsome style.

The Star ventilator, which is being introduced by Merchant & Co., of Philadelphia, New York and Chicago, is guaranteed by the makers to be the best in the market for the cure of smoky chimneys and the prevention of downward drafts. We understand that it is in successful use on steamboats, on railway cars, yachts, depots, as well as residences and factories. The circulars sent out by the firm contain many interesting particulars.

We referred in a recent issue to the "Wood-worker's Guide" which is being sent out by the Stanley Rule and Level Company. A copy of it has been handed to us since our last issue went to press. It is neither more nor less than an illustrated list of the improved labor-saving carpenters' tools which this company manufacture. Every inch of space in the book is utilized to the best advantage; numerous illustrations are presented; dimensions of the different tools are given, and such facts as prices and capacity are clearly indicated. The book is one that should be in the hands of every wood-worker, to say nothing of the export trade. The frontispiece, or illustration on the first page cover, is a general view of the works of the company at New Britain, Conn., while on the last page is a very happy caricature of one of the planes showing to what use at least an artist could put it.

The Canton Iron Roofing Company, Canton, Ohio, direct the attention of the building trades to their steel roofing, furnished either plain or calcamined; also to corrugated iron for roofing and siding, and a long list of roofing sundries which they manufacture. A catalogue, price list and samples are sent upon application.

CARPENTRY AND BUILDING

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NOTES AND COMMENTS.

THE subject of builders' contracts has been somewhat caretully canvassed by the different architectural and building organizations throughout the country for some time past. Heretofore it has been customary for the builder to sign almost anything which the architect and house-owner prepared for him, and as a consequence he has in many instances been very innocently led into traps, and only discovered at the end that he was dealing with people who were smarter than he in the making of the provisions of the contract. In many cases contracts are drawn making the architect the sole arbiter as between the builder on the one side and the owner on the other. When it is considered that the architect is the paid retainer of the owner, it is clear that arbitration under him, whenever a dispute arises, is altogether a one-sided affair, and unless the builder has been smart enough to obtain some advantage over the architect in the progress of the work, so that in his own interest he is obliged to take care of him, the builder's rights in many cases become secondary in importance.

THE architects of the country, as well as the builders, have long been ready to acknowledge defects in the present system of contracts, but in all they have done they have approached the subject from a different point of view from the builders. The question of uniformity of contracts has been discussed in various directions, and many arguments have been advanced in support of the proposition. If we mistake not, the question has been raised at all the recent meetings of the architectural organizations, and it has been actively canvassed by the builders' societies, including the meeting of the national convention. Our brethren in the building trades in Canada are giving like consideration to this general question. We have recently received from the Builders' Exchange, of London, Ont., through Mr. George Gould, secretary, a copy of a contract that has been drawn for that organization by Mr. W. R. Meredith, Q. C., a competent authority on legal questions in the Dominion. The contract before us claims to be impartial in all its provisions as between the proprietor and the contractor. We are informed that it so thoroughly meets the views of the contractors of the Dominion that they have decided to sign no other. We have no doubt that many of our readers will be eager to examine the provisions of this contract, since it deals with a question that is of such general interest. The document so long that we are unable to print it. Probably a letter addressed to the secretary upon the part of those who desire to examine it in detail will secure a copy.

A BRIEF summary of the Canadian form of contract above referred to will, perhaps, be of interest. Provision is made that 80 per cent. of the contract price shall be paid on estimates as the work progresses. A further payment of 8 per cent. is made when all the necessary materials have been delivered and the work done, except the removal of the scaffolding, cleaning up, &c., and the remainder, including all extras, is to be paid within 30 days from the completion of the work. The contract is drawn in such shape, so far as the form is concerned, as to be adapted to a contract as a whole, or for one particular line of trade. Specifications and drawings are intended, it is declared, to co-operate; so that any work shown in one and not in the other is to be included as though mentioned in both. The architect is afforded every facility for examining the work and material as the job progresses. The contractor is not allowed to sublet the work except with the consent, in writing, of the architect. The proprietor has the right to make changes and alterations at any time during the progress of the work, but it is provided that such variations from the original intentions shall not make void the contract. The value of omitted work is to be deducted and the value of extra work is to be added. Where the work does not progress with sufficient rapidity, it is provided that the proprietor may cancel the contract or carry forward the work at the expense of the contractor. The architect is made the judge in matters of dispute concerning the true construction or meaning of the drawings and specifications, but the contractor has the right of appeal under certain conditions to an arbitration. The board of arbitration consists of three, chosen in the usual way.

FIGURED or written dimensions on drawings or in the specifications supersede measurements by scale. The risk from loss by damage by fire rests entirely with the contractor, provided it occurs from his carelessness or that of the workmen employed by him. The same provision relates to accidents to employees. It is provided that the proprietor shall insure the building from time to time, to the extent, at least, of two-thirds of its value. The amount of the premium is to be assessed pro rata on the several trades; and in case the proprietor does not insure the premises, he has to run all the risks of loss from fire so far as regards the value of the work. The work done and material delivered on the premises, after 80 per cent. has been paid, according to the terms of the agreement, become the property of the proprietor. One clause in the agreement provides for liquidated damages for loss from delay in the work beyond the stipulated time. Where delay occurs by reason of the inclemency of the weather, or by reason of strikes in particular trades, it is provided that the architect shall extend the time for work, making a just and reasonable allowance. The drawings and specifications are to be returned to the architect on the completion of the work. Where the contractor fails to pay wages, it is provided that they shall be paid out of the amount due the contractor. The contract is to be signed in duplicate. Other features might be referred to, but the principal items have been noted. We do not notice any provision in the form before us relating to sureties. This is a special phase of the question which American contractors have discussed, but which does not seem to be covered in this blank. The ground has been taken in this country that mutuality in this regard is as important as in any other.

THE statue that is to surmount the new City Hall, Philadelphia, is to be of bronze. Owing to the extreme hight of the tower on which it stands, the figure is, of necessity, of mammoth size. The distance from the ground to the top of the head will be 540 feet, from which the reader will readily gain an idea of the magnitude of the work. The modeling of this gigantic figure has already been accomplished. The plan pursued was that usual in work of this kind—namely, making first a sketch of the model, of which the natural size model was to be an exact counterpart. The full size figure is 40 feet high and will weigh over 30 tons when completed in bronze. It is said to be the largest model of the human figure that has ever been made in this country. The modeling was commenced by placing a hoop of iron just above the point representing the crown of the head. From this hoop many small strings at different places were hung wherever it was wished to give firm lines. Along these lines marks were made so as to guide the modelers as to hights, widths and other points of comparison. Then there was prepared a wooden framework or skeleton on which the legs were modeled in clay. The whole figure was built up in this way in clay, but of course in sections. After the clay model had been finished, from each part—legs, arms, body, head, &c.—casts were taken which will serve as patterns in the final casting process. The subject of the figure, it is scarcely necessary to remind the reader, is that of William Penn. No other figure would be considered appropriate. He is represented as a young man in the full vigor of manhood and in physical proportions which would

render possible the traditions of his outdoing the Indians themselves in some of their feats of activity. The design, we understand, is taken from the original painting presented to the Historical Society of Pennsylvania hy his grandson, Granville Penn. The figure is in a speaking attitude, and the left hand is represented as holding the original grant of the city of Philadelphia.

THE Chicago building interests seem to be the natural prey of the strike disease. The painters are now the disaffected members of the allied crafts. They demand an increase in wages from 27½ cents an hour to 37½ cents, as a minimum, and the working day to consist of eight hours. Not securing this concession, a strike was inaugurated on Monday, the 19th ult. There are estimated to be about 2000 painters in Chicago, and of this number the strikers claim that 1400 are out, while the master painters insist that not over 600 are idle for this reason. The truth lies somewhere between the two. The usual claims are being made by both parties as to ultimate success. The men say they have ample funds in the treasury of their union, and will be able to sustain a long fight, while the employers say they will never concede the demands made upon them, which are considered unjust and very unreasonable. Good men now earn more than the rate asked for, but poor workmen are not worth the present rate of wages. To put all on the same level is an absurdity. As the strike has occurred so early in the season, it affects repair work almost entirely, and therefore in itself it does comparatively little injury except to individual employers who are under agreement to finish jobs in a limited time. Before the building season proper fairly opens it will probably be settled. It is disquieting, however, as showing the uneasy feeling pervading labor circles, aud it may perhaps prevent the undertaking of some building operations which would be pushed forward if all the conditions were favorable.

THE precautions against fire in the Broadway Theater, Forty-first street and Broadway, New York, which was opened a few weeks since, are specially noticeable. The balcony and gallery are each provided with at least four modes of egress. The building itself is thoroughly fireproof, and what little woodwork there is has been coated with a fireproof preparation. Water-pipes are run through the house with four hose connections on each floor, and on the stage a network of pipes is so arranged as to pour out their contents on the application of the slightest heat. Sprinklers are attached to these pipes every 10 feet. The scenery when not in use is kept in a fireproof room, and of the three curtains one is of fireproof material, being made of asbestos. The seating capacity of the building is a little less than 2000. The lighting is by electricity, with the exception of the stairways leading to the upper gallery, where, in accordance with the law, oil lamps are used. An electrical device, for throwing open, at once, all the ways of exit, has been introduced. This building, as a theater, has the peculiar advantage of being absolutely separate and distinct; being surrounded by streets on three sides, while on the fourth side it is divided from adjacent buildings, by an area or passageway 7 feet in width.

Builders' Estimates.

The National Association of Builders, at its recent convention in Cincinnati, Ohio, after careful deliberation, formulated certain "Rules and Conditions" which contractors may properly require to be observed by owners, architects and builders when estimates are to be made. The National Association recommends all its affiliated bodies to secure the adoption of these rules as soon as possible, and further recommends, as the proper method of procedure, that the co-operation of architects be obtained in the establishment of the same. The following are the rules and conditions referred to:

RULES AND CONDITIONS UNDER WHICH ESTIMATES SHOULD BE SUBMITTED BY CONTRACTORS IN THE BUILDING TRADES.

1. *Complete Plans and Specifications.*—General plans and details, when offered for final or competitive estimates, should be presented on a scale not less than ⅛ inch to the foot, should be done in ink or by some process that will not fade or obliterate, and be complete in every part. Specifications should also be presented in ink.

2. *Scale of Drawings.*—Such portions of the drawings as require a larger scale than general drawings, for a thorough comprehension of what will be demanded should be so presented.

3. *Specifications to be Definite.*—Specifications should be definite. All such indefinite demands as "The contractor must furnish all work that is necessary," or "All work that the architect may require," &c., are improper and should be eliminated before estimates are submitted.

4. *Indefinite Depth of Foundation.*—Estimates should not be given to cover an indefinite depth of foundation. Foundations which have to go below the depths shown upon plans should be paid for as extra work at prices agreed upon.

5. *The Specification to be the Guide for Estimating.*—The specification should be taken as the guide for estimating, and all demands made by the specification, unless objection be made thereto in writing when bids are submitted, should be covered in the estimate offered.

6. *Improper Demands of Plans.*—Demands made by the plans, and not referred to in the specification, should not be considered in the estimate offered.

7. *Grouping of Special Work.*—Everything that will be required in the various branches of work should be mentioned in the specification, classified and grouped under appropriate headings.

8. *Cutting and Jobbing for Other Mechanics.*—Specifications should distinctly state that when it is necessary to cut or change the work of one mechanic in the placing of the work of another, then the said cutting should be done by the mechanic whose work is so changed or cut, he being paid therefor by the mechanic whose work makes the said cutting necessary.

9. *No Restriction on Sub-Estimates Unless Notified.*—Contractors, when required to estimate for work involving any or all the subcontract, should not be restricted as to whom they shall employ as sub-contractors unless previously notified.

10. *Percentage for Sub-Estimates Added to Contract.*—Should portions of the work be reserved by owner or architect, and estimates therefore obtained by them, the principal contractor, if required to include the said subestimates in his contract, should receive a compensation therefor of not less than 10 per cent. on the amount of the said sub-estimates.

11. *Opening of Bids. Delay in Awarding Contracts.*—Invited bidders should receive due notice of time and place of the opening of bids. Bids, upon being opened, should be immediately displayed to the inspection of all bidders, and for a period of three days thereafter. Contracts should be awarded by owners or architects within a reasonable time (say ten days) after a competition is closed. Contractors should not be holden on estimates retained longer than ten before deciding to award contract.

12. *Rights of Lowest Bidder.*—In all cases where the work is let under plans and specifications prepared by an architect, for which estimates have been received and opened, the lowest invited bidder should be entitled to the contract, and estimates for changes should only be made by him unless the said changes involve a complete alteration in the plans, and then the full competition should be again opened. In no case should the two lowest bidders be called upon to estimate ordinary changes to decide which is entitled to the contract. In case the price estimated for changes should not be satisfactory to the owner, it should be settled by arbitration.

13. *Compensation for Lowest Bidder when all Bids are Refused.*—Should all solicited bids received be refused, then the lowest bidder should be entitled to compensation as follows: For estimates amounting to $5000 and under, $25.00; $5000 to $50,000, $50.00; over $50,-500, $100.00. No compensation for estimates should be required where the contract is awarded to the lowest bidder.

14. *Security Exacted.*—When security is exacted from a contractor a like amount of security should be required of the owner.

15. *Rights of Sub-Bidders in the Hands of Architects.*—Sub-bids, when solicited by the architect, should not be shown by him or exhibited in his office, but should be retained by the architect until the competition is closed and principal contracts awarded, when they should be disposed of in the way and manner provided in these rules—viz.: added to principal contracts (with a percentage; see Rule 10)—if agreeable to principal contractor—or direct contracts made.

16. *Rights of Sub-Bidders at the Hands of General Contractor.*—A principal contractor having been awarded a contract involving subcontracts, his estimate having been based upon sub-estimates, or bids which he has solicited and received, he should award the said sub contracts to the lowest bidders, and should notify the sub-bidders that their estimates have been accepted or rejected as soon as the contract has been awarded to him. The fact that such sub-bids were received by the principal contractor, previous to the submission of his estimate, should be conclusive evidence that they were used by him.

17. *Unsolicited Bids.*—Should a principal contractor receive a sub-estimate unsolicited, he should not be considered under obligation to use the said bid, even if it be the lowest; but he must not reveal the bid nor use it in any way to influence any other party.

18 *Penalty.*—Any member detected in trading on any of the sub-bids, whether they be solicited or unsolicited, or however knowledge of them may have come into his possession, will be liable to forfeiture of membership, censure or suspension.

19. *Estimate in Aggregate vs. Estimate in Detail.*—Contractors should decline to give architects or owners estimates in the aggregate when the said architects or owners are soliciting estimates in detail, nor should estimates be furnished in detail when estimates are being solicited in the aggregate.

20. *Penalty vs. Premium on Completion of Contracts.*—Whenever the completion of a contract will be required in a certain time, then that time should be mentioned in the specifications, and if a penalty for non-completion is to be exacted of the builder it should be so stated, and also that the owner will be required to pay a premium of like amount to the builder if the work is completed before the specified time.

21. *Award of Contracts, &c.*—Contracts should be awarded upon the figures as shown at the opening of the bids. Bidders should not be permitted to amend estimates after the bids have been opened, and previous to the award. The bidder to whom a contract is awarded should be required to sign the contract for the amount of the bid he has submitted, or withdraw his estimate.

THE PLATES.

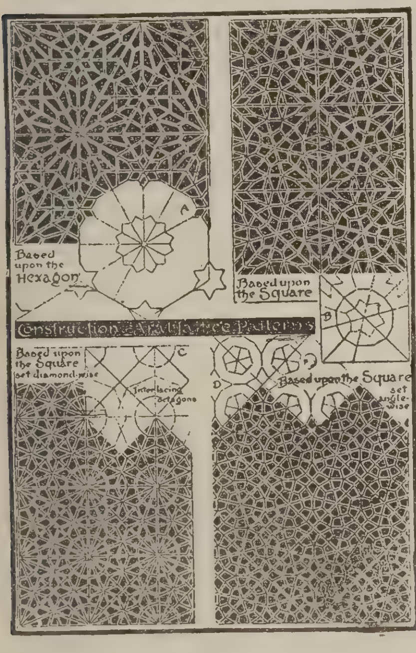
In Plate XIII is presented a very handsome design of wall paper decoration, representing a pattern recently brought out by a leading English firm. This design, taken in connection with the illustrations which appear on the opposite page with the article on the "Planning of Ornament," will prove of interest to our readers.

In Plates XIV and XV are given some of the details of a house in West 82d street, New York, designed by Emanuel Gandolfo, architect, and built by V. Del Genovese, the floor plans and a portion of the details of which were given in our issue for last month. There is also contained in Plate XIV a parquet floor pattern by R. Fischinger.

In Plate XVI there are shown two designs of sideboards in the English Renaissance style.

The Planning of Ornament.

Every architect and draftsman is called upon, sooner or later, to suggest ornamentation for some particular piece of work. To some it is given by nature to suggest pleasing forms; to others the planning of ornament is a difficult matter at best, and something that is always pursued with indifferent success. Designing becomes a profession in itself for such things as wall papers and various kinds of textile fabrics. That there are different methods that can be followed, and that ornament may be analyzed and its elements considered, is, perhaps, a fact to which few among our readers have given attention. Several books, inexpensive in their cost, have been recently issued, that give attention to this subject. It is our purpose to refer to one or two of them in this connection for the purpose of showing to what degree ornamentation may be analyzed. The illustrations presented on this page are from two little volumes by Lewis F. Day, a well-known designer, which have been published as expositions of the



The Planning of Ornament.—Fig. 1.—Construction of Arabesque Patterns.

method and principles of the branch of art in which he is an expert.

The title of one of the volumes referred to is the "Anatomy of Pattern," and the other "Planning of Ornament." The first is a consideration of the plan upon which ornamental diapers are, or may be, constructed. We are thus qualified in refering to this volume, because the book is rather too apt to convey to a thoughtless reader an idea that systematic repetition is an essential, or even necessary, quality of diaper ornament, which certainly is not the case. On the contrary, systematic repetition of the parts at equal distances in surface ornament of this type is only an absolute necessity in a commercial sense, for example, in order to make it possible to print a decorative diaper to cover large spaces at a reasonable cost. Without such an arrangement much very charming decorative work which is in use in wall papers and tile would be commercially out of the question, and such decorations could only be used by those who are extremely wealthy. The author of the volume referred to recognizes this fact and insists in various passages that the cost of production is an important element in the matter of pattern designing for mechanical reproduction by printing. On the other hand, it would seem that the author occasionally desires his readers to remember that the main object in designing many of the higher forms of repeating pattern is to avoid the appearance of repetition and to cheat the eye by complicating and covering up the skeleton lines of the pattern into the impression that there is no repetition, and that the ornament is drawn with a free hand over the whole surface. Accordingly, he uses the term "pattern" in the sense of a repeated ornament.

The popular idea of the process of ornamental design is that the artist has only to sit down before a piece of paper, and like a spider spin out the fancies that may crowd his fertile imagination; whereas, Mr. Day goes on to say, ornament is patiently built up on lines inevitable to its consistency. All ornament is not pattern work. Many of the simple forms used in geometrical diaper ornament become ornamental only by being regularly spaced and connected according to a geometrical plan. Squares, triangles, circles, diamonds and one or two other simple and elementary geometrical forms which, taken singly, are not in themselves ornamental, become ornamental as soon as they are arranged geometrically over a space according to a definite system. The effect is hightened by alternating their colors or shades, and is still further affected by artfully cutting off and intercepting some of their main lines. Mr. Day illustrates this part of the subject by several diagrams, and shows how very simple the geometrical bases of interlacing patterns of the Moorish order, for example, really are, and the apparent elaboration and real simplicity of the decorative patterns of this class are well brought out in the illustrations presented herewith. Referring to Fig. 1, it will be noticed that geometrical forms are exclusively employed. Fig. 2 shows what the Japanese craftsman produces and what he thinks is a piquant effect, by ornamenting various parts of the surface by bits of geometrical diaper of different kinds stuck in quite irregularly in broken patches. Fig. 3 is one of the designs given by Mr. Day in illustration of another kind of ornamentation. The essential quality of a

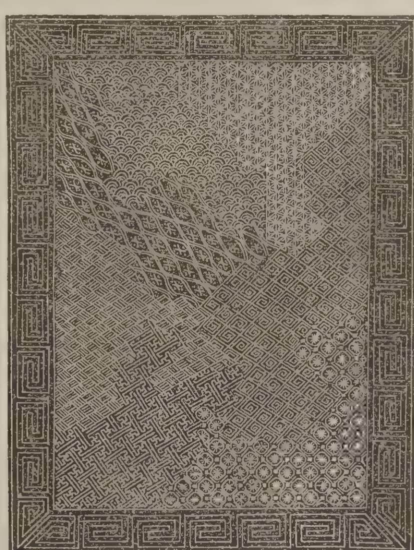


Fig. 2.—Example of Japanese Geometrical Diaper.

design of this type is entire freedom. It is a decorative design consisting of a conventionalized representation of natural growth. It is laid out here so as to repeat in sections, because only in this way can it be printed as a wall paper with a requisite economy of production. It is no advantage artistically to make it repeat; on the contrary as one critic observes, it would be far better if it could be drawn with entire freedom and with continual variation, so long as a balance is preserved. The design is in fact specially arranged in what is called a "drop" pattern, that is to say, one in which each repeat is joined on at a different level from

Fig. 3.—Conventionalized Representation of Natural Growth Arranged in the Form of Repeating Pattern.

the last one, so as to get rid of the chance of the horizontal lines forming too prominently. As an example of free ornamentation in which the pattern does not repeat Fig. 4 is presented. This is a bit of Scandinavian ornamentation from a doorway, of which there is a model in the architectural court in the museum at South Kensington. Speaking on this point, one of our English architectural exchanges asks if the work would be more truly ornamental if the grotesque bird form were solemnly repeated at regular distances. The second work to which reference is made above is in a sense a further consideration of the same general subject. In a single article we can do no more than to get before the reader the one idea that ornament is capable of analysis or dissection, and that it may be planned, or rather designed, upon definite principles. The student of the art of ornamenting or decorating needs at the outset to familiarize himself with the laws which govern the work he is to do, and to become able at an early stage to analyze any piece of effective work, and thus discovering the plan upon which it was produced. The wall paper design presented in one of the plate pages of this issue is an interesting study in this connection.

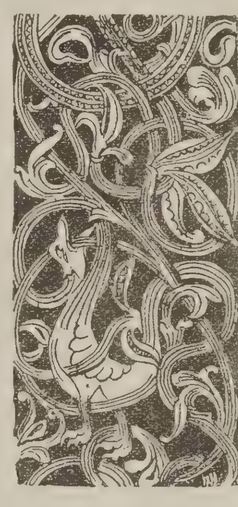
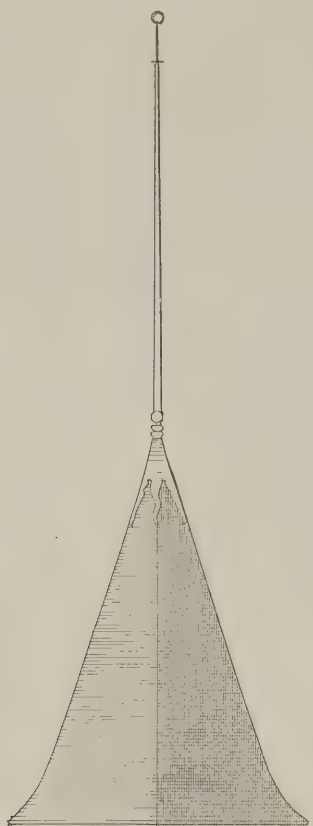


Fig. 4.—Example of Scandinavian Ornamentation.

New pumping engines for the Water Works at Toledo, Ohio, are required. A public letting was advertised and bids were opened on the 15th ult. Various prominent pump builders were represented. Action was deferred.

Country Hotel.

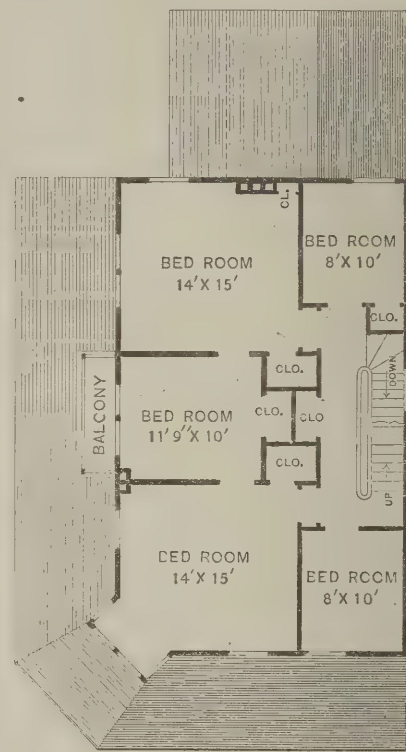
The accompanying elevation and floor plan represents a design for a road house or small country hotel. It is a building about to be erected in Brooklyn on the road to Calvary Cemetary, L. I. The design has been prepared by Charles E. Hebberd, 62 Broad street, New York City. The corner or main room is intended to be occupied as a saloon or café; back of this is the dining-room, and still further back the kitchen. The basement and cellar extends under the main house and is communicated with through a trap door in the floor of the corner room, or by stairs under the main stairs. Five sleeping rooms are provided in the second floor and three in the attic. No bathroom is contemplated. Extensive piazzas about the building, and the tower make this a roomy and pretentious appearing building. Slight alteration, the architect states, would adapt it for use as a private residence.



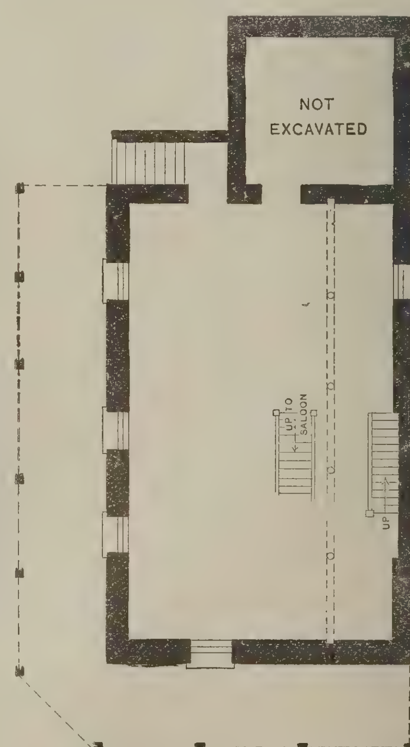
Country Hotel.—Designed by Charles E. Hebberd.—Front Elevation.—Scale, 1/8 Inch to Foot.

Building by Machinery.

Somewhere among the "Stones of Venice" Mr. John Ruskin discovered the idea that modern workmen are dissatisfied with their condition because they are dissatisfied with their work. The introduction of machinery has dispensed with the use of the inventive faculties. Men, instead of using their hands for the expression of their ideas, have become only machines tending machines, the inanimate workman demanding almost as much thought in the performance of its task as its helper. Perhaps Mr. Ruskin is in part right, but he cannot be altogether right. The hod carriers of Venice would have sighed for a modern steam engine to operate one of those swift devices which we see springing from the ground to the capstone of a 10-story building, loaded with the material needed for the mason. And who of all the laborers who wrought upon the Ducal Palace would not have welcomed the modern agencies for swinging stones into position where all the muscular co-operation needed can be furnished by a hand hardly heavier than the hand of a child? See the arches and pinnacles of St. Patrick's Cathedral day by day nearly springing toward the clouds, while, almost invisibly, the workmen direct the silent magician by which the chief labor is performed. It was not so when St. Mark's climbed painfully above the waters of the Venetian Sea.



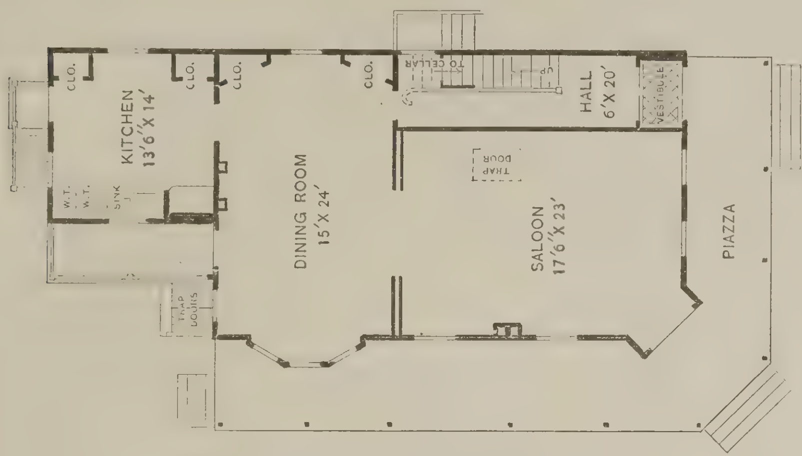
First Floor Plan.—Sca , 1-16 In. to the Foot.



Foundation Plan.—Scale, 1-16 In. to the Foot.

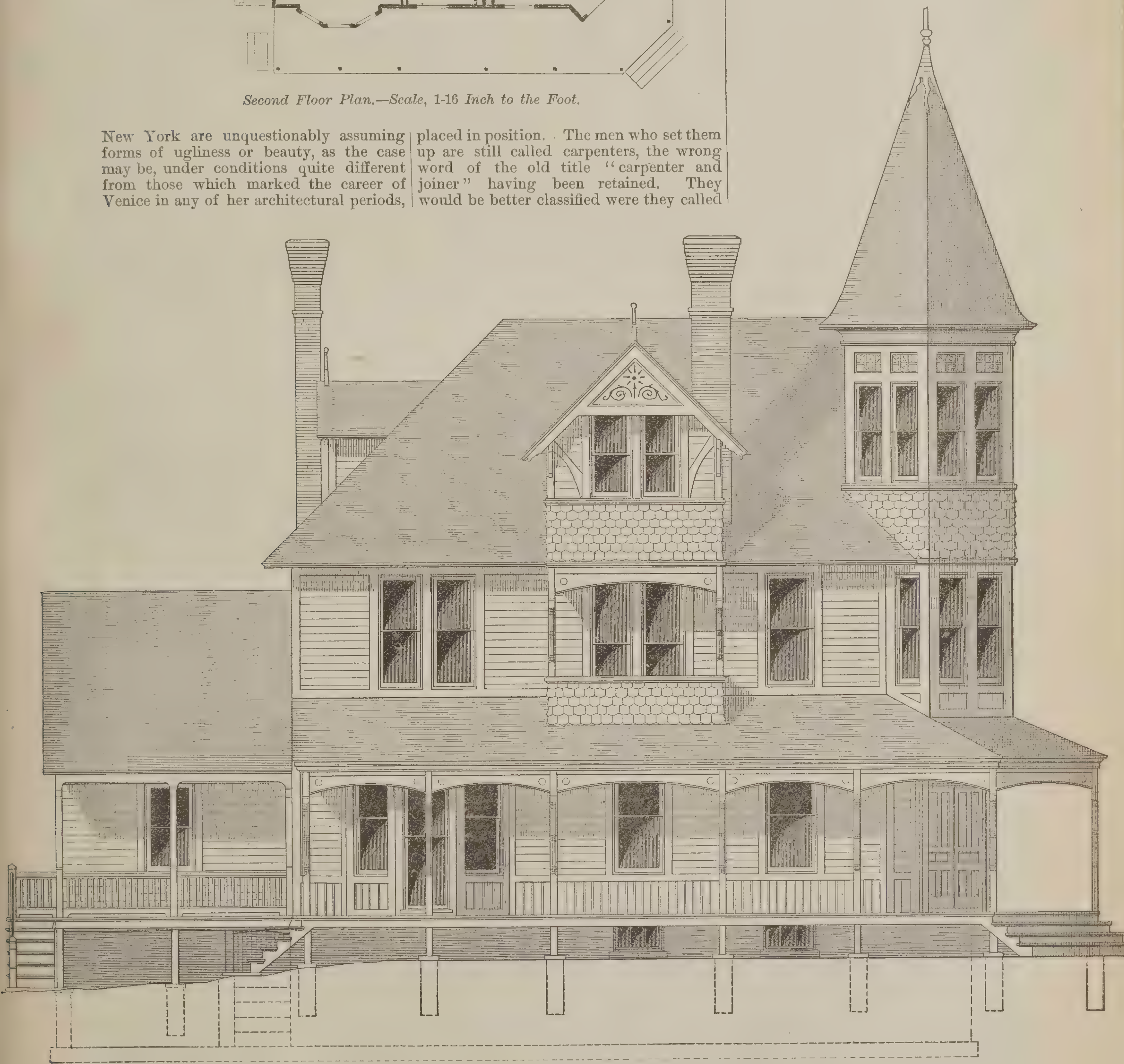
Very little, after all, except the merely mechanical work can be done by machinery. Wherever a touch of true art is required, the practised eye and the trained hand are still omnipotent, and to the ex-

tent that any handicraft labor can be performed by machinery, it may be spared from the list of arts that have the power of returning to the laborer an intellectual compensation for his toil. The stones of



Second Floor Plan.—Scale, 1-16 Inch to the Foot.

New York are unquestionably assuming forms of ugliness or beauty, as the case may be, under conditions quite different from those which marked the career of Venice in any of her architectural periods,



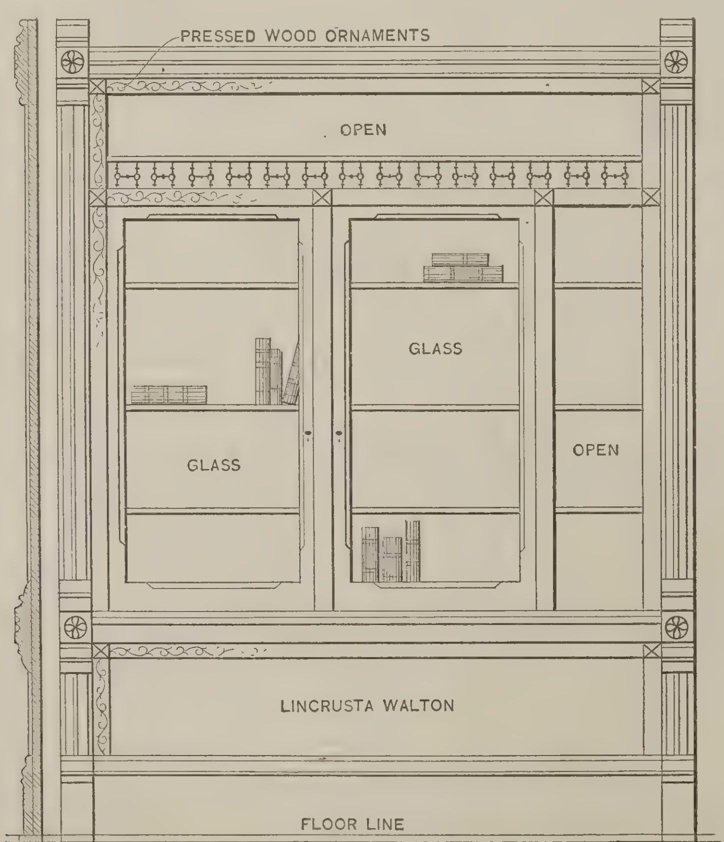
Country Hotel.—Side Elevation.—Scale, ⅛ Inch to the Foot.

whether Byzantine, Gothic or Renaissance. Few arts have been more radically modified by the introduction of machinery than the art of building. The stone mason holds his own against the innovator more stubbornly than the carpenter; but almost entire dwellings, above the foundations, are now manufactured in factories, and then delivered on the ground ready to be placed in position. The men who set them up are still called carpenters, the wrong word of the old title "carpenter and joiner" having been retained. They would be better classified were they called joiners, or they might be called finishers in carpentry; but they are certainly not in any true sense carpenters. The real carpenter has become a machine, and though this machine may be able to prepare only the manufactured material for frame buildings, it is equally true that all the interior fittings, whatever the material, of brick, stone or marble buildings, are factory made, and delivered ready to be placed upon the walls or wherever they may be needed.

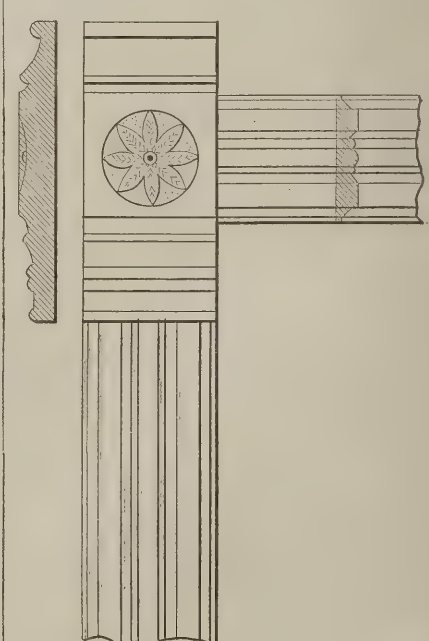
The entering wedge to this revolutionary change was found in the sash and blind factory. In the beginning these factories produced nothing but window and door fittings; but from this point the transition to factories which turned out balusters for stairway decoration, and finally entire balustrades and the stairs themselves, was easy. At last it was discovered that the whole art of cabinet-making could be converted into an architectural art, and sent in with all its machinery and designs to reinforce the builder. This was a momentous discovery. A style of interior decoration en-

tirely novel has been introduced, and many of our houses, though externally constructed of brick and stone, are fashioned largely of choice woods in the interiors. In fact, we are beginning to turn our houses inside out, the masons, who, on frame buildings, formerly worked mainly indoors, having been banished to the other side of the walls. Pass through the showroom of a factory erected for the production of interior fittings for dwellings, or, rather, for the construction of the component parts of entire dwellings above the foundations, and you witness a curious and varied exhibition. Mantels of every conceivable form, if the phase may be used to denote variety where variety may be made infinite, are set up for examination. They lack no element of completeness either in the mantelpieces themselves, in the facings below, or in the superimposed decorations. You have only to choose your model, and it will be sent home and put up just so in your new dwelling. Your window casings and door casings may be also selected from the specimens before you, and balusters, posts and handrails for stairway decoration are

Details of House Designed by George F. Barber, De Kalb, Ill. (For Elevations and Plans, See March Issue.)—View in Stair Hall. Scale, ½ Inch to the Foot.



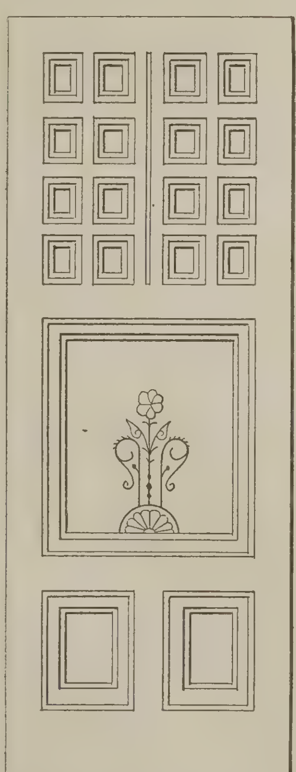
Built-in Book-Case in Sitting-Room.—Scale, ½ Inch to the Foot.



Casing and Corner Block.—Scale, 1½ Inches to the Foot.

offered at every turn and of every style of turning. Indeed, if you are pushed for an architect, you may be carried to the exterior and shown models for finials, cornices, balconies, capitals, columns, bases, plinths and so upward and downward to the cold stones of the lower foundations. For observe that not everything is of wood. These house-fitting establishments are apt to be either the manufacturers or the agents of the manufacturers in every variety of material used in house construction, whether wood, marble, stone, slate or iron. They will never send a customer away unsatisfied.

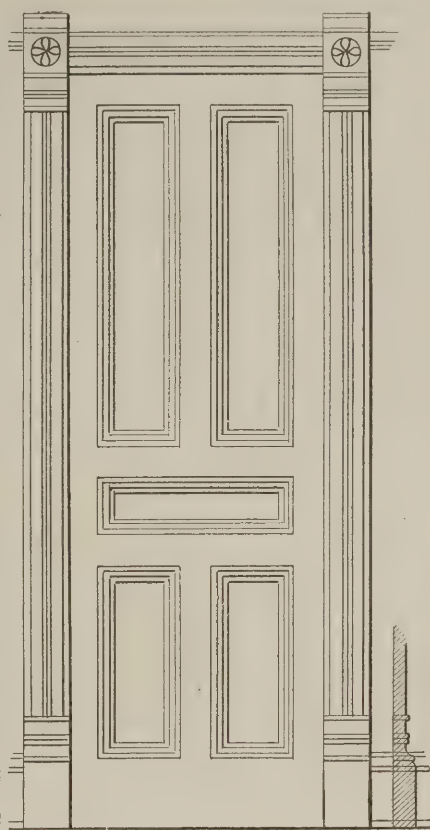
In the deluge of wood interiors that has swept over the country since the introduction of machinery in house building, the rival kinds of material do not give way without a struggle, and they stand their ground so well that it is to be suspected they will soon again have their inning. It is true that the finest houses in New York are at present being furnished with wood mantels and other interior decorations to correspond. The marbles have fallen under a cloud, but they have not been quite driven from the field. They reign by proxy in slate, a material made by chemical processes and polish to imitate marbles in a great variety of colors, and offered in the market at a price that challenges rivalry from any other material. It is susceptible of the richest decorative finish, and slate mantels of really artistic design can be furnished at about $20 each. So long as this is true, the slate mantel must be able to hold its own against its more inflammable rival. The Endolithic marble has also entered the field as a rival of wood. This is not an imitation of marble, but it is the white marble itself colored by a process, when desired, through the entire substance, in perfect imitation of any variety of marble known either to ancient or modern art. It has remarkable green, blue, amber and mottled tints, and a picture painted upon the surface may be sunk into the substance to any desired depth. It would be rash to



House Details.—Detail of Front Hall Door. Scale, ¼ Inch to the Foot.

say that wood, which is at best a very perishable material and entirely unfitted for anything but the commonest forms of art, can permanently hold its own against such a formidable rival, supported by the resources of both painting and sculpture.

But in the meantime the wood workers are making the most of their advantages.



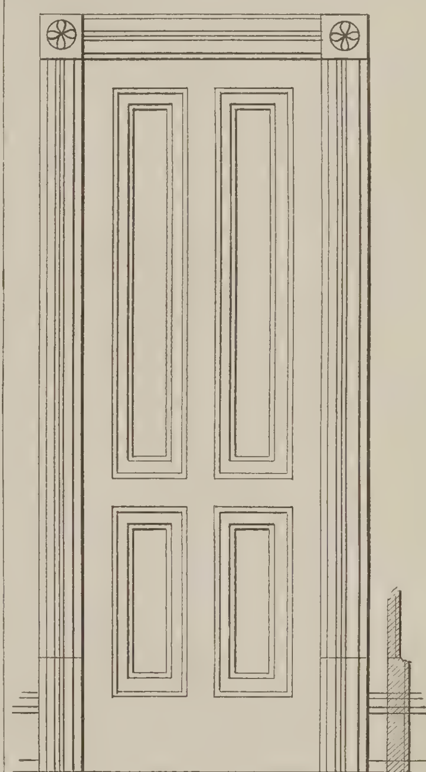
Door and Trimming in First Story.—Scale, ¼ Inch to the Foot.

It is understood in the best factories that carving can only be done by hand, and hand-work alone is relied upon when it is desired to represent vines, flowers, or any more ambitious objects of decorative art. But something suggestive of carved moldings are produced by turning and quartering; and in some of the Western factories, where they may be expected to take the lead in everything artistically wrong, they even attempt an imitation of all possible designs in *bass-relief*. Their work is produced, however, by embossing on a thin piece of veneer, the impression being afterward backed by solid wood. This is not an art that can survive the period of elaborate cheapness through which we are passing, nor even take a place among the best specimens of interior decoration in wood. It may be said, in general terms, that the machine reaches its limit as a contributor to architecture at a point where the sculptor becomes the companion of the architect.

There is an economic as well as an artistic side to the art of machine building, and from the economic side it can be studied only to be commended. It is enabling us to build well with a greatly less expenditure of money than building operations would cost were we dependent upon hand labor alone, and it is also the cause of a great deal of building that would never take place but for its co-operation. It is quite certain that much of the building to be witnessed in our great cities is due to the existence of these large manufacturing firms, and were it not for their transactions, building operations would have to be greatly curtailed. To be thoroughly alive, building movements must always be carried on by some form of credit, and it is to the interest of these firms to supply the needed accommodations. They can protect themselves by second mortgages, and furnish house fittings, or whole houses for that matter, on securities that would hardly be recognized by a bank. They may sometimes meet with losses, but their total profits derived from a stimulated building industry will always be sufficient to justify the risks. In fact, they may be said to stand behind the building industry, and to almost sustain it on their own resources. In this attitude they offer one of the best illustrations to be found of the superiority of modern financial systems. The world is getting tired of piling up pebbles in the shape of rocks, when the rocks themselves may be had for the mere trouble of placing them.

House Details.

On pages 76 and 77 we present the balance of the details of the house design published in the March issue. The study in question represents a house built for Charles E. Bradt, De Kalb, Ill., and was prepared by George F. Barber, architect of the same place. The perspective view, elevations, plans and details contained in



Door and Trimming in Second Story.—Scale, ¼ Inch to the Foot.

our last issue, combined with what is presented in this number, constitute a very complete study, and one that will doubtless have interest for many of our readers.

The many different processes in use for rendering curtains, &c., incombustible are said to be, without exception, unsatisfactory and imperfect, the fire-proofing material with which they are saturated either disappearing or losing its efficacy after a time. The *Chronique Industrielle* states that M. E. Tepper, of Berlin, has invented a process by which it is possible to paint decorations on an absolutely incombustible iron wire cloth, the meshes of which are about 0.04 inch square. It is covered by a mechanical process with a yellow plaster that is incombustible and insoluble in water. This coating is very liquid when applied, but afterward takes the consistency of firm clay. It receives paint readily and can be rolled upon poles about 2 inches in diameter without injury. The weight of the prepared material is less than a pound and a half per square yard, and the price does not exceed that of decorations made incombustible by impregnation.

Course in Pattern Making, Sibley College, Cornell University.

In this issue we conclude the course in pattern making begun in January, and continued in the issues for February and March. Fig. 41 illustrates a bearing set at an angle on its pedestal. Fig. 38 is a clutch and cam, while Fig. 42 is a pattern for a peculiar form of oil cup. Each of these gives a new and useful exercise in pattern making, molding and fitting up, as do in a less degree the simpler constructions, such as the brackets shown in Figs. 39 and 43. We might continue our descriptions almost indefinitely, but what we have presented is enough to show how the modern system of grade instruction in shop work in the technical schools adapts itself to the solution of the important problem that is presented. When the student has acquired proficiency in the use of tools by the practice of these smaller tasks, he is put on what he recognizes as real work, the construction of commercially valuable goods, such as lathes, steam engines and other useful machinery and apparatus as is demanded in the course of work in the shop or can be sold in the general market. In all of the best schools devoted to technical instruction this is the general line of work, though the proportion of manual training and of real live construction in several schools is not the same, but all include more or less of each.

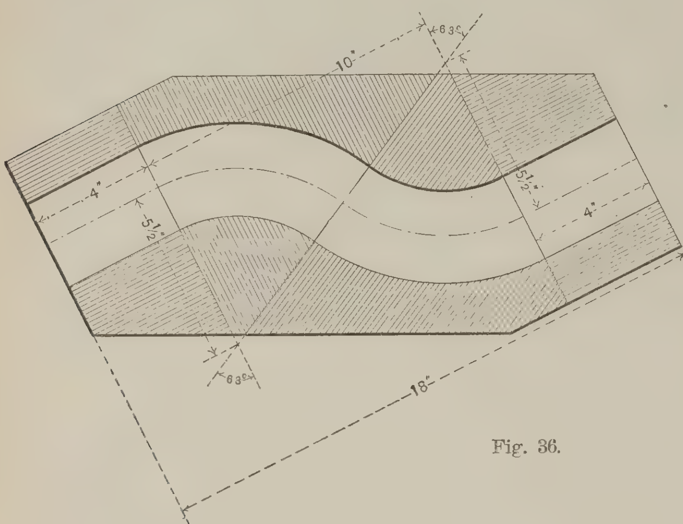
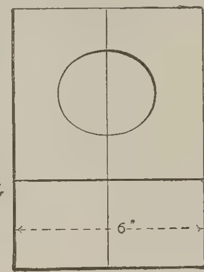



Fig. 36.

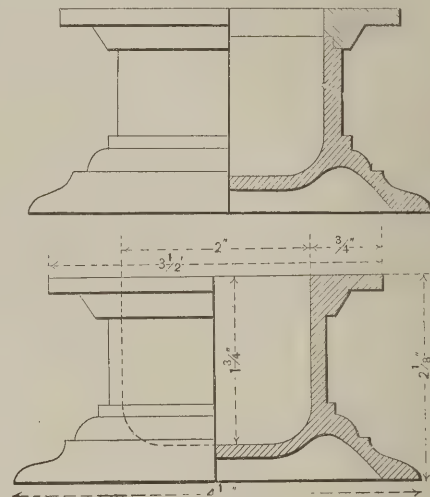


Fig. 40.

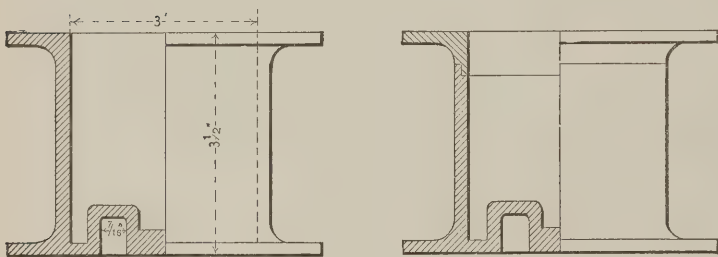


Fig. 37.

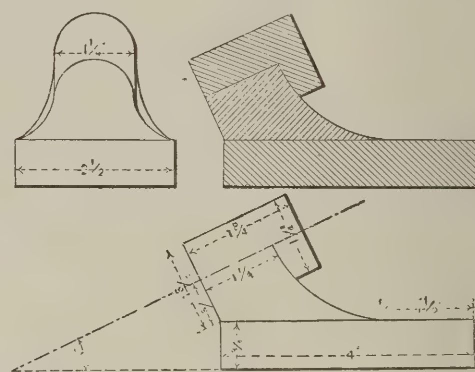


Fig. 41.

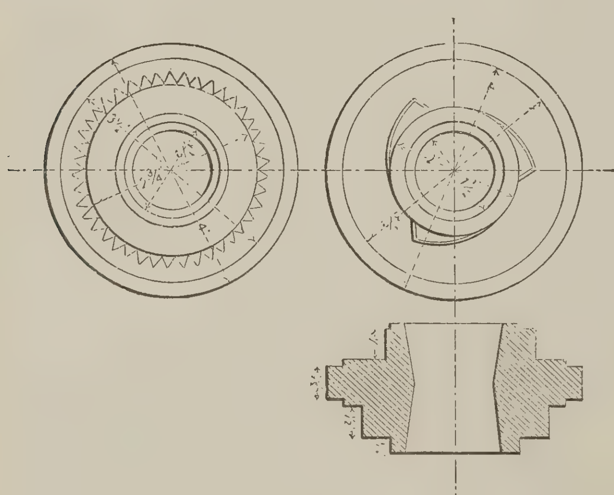


Fig. 38.

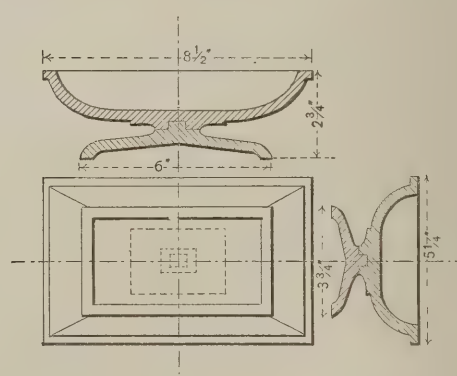


Fig. 42

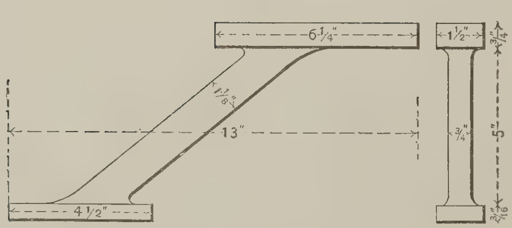


Fig. 39.

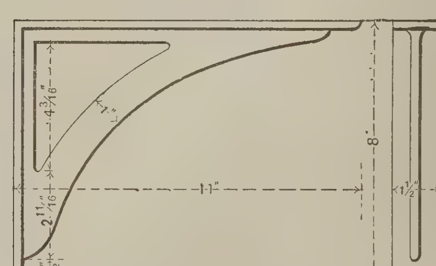


Fig. 43.

Diagrams Illustrating Part of the Course in Pattern Making, Sibley College, Cornell University, Ithaca, N. Y.—Scale, 2 In. to the Foot.

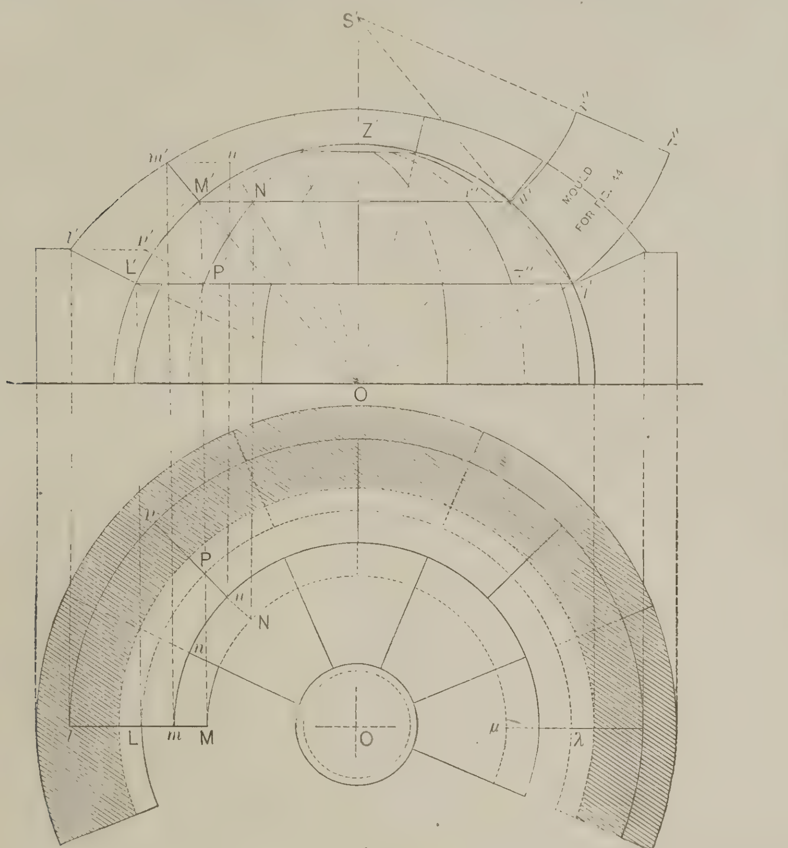
The building trades in Chicago are active and in Boston the prospects are considered very promising. The prices for building materials in Boston will, from present appearances, remain about the same as last year, when they ruled generally a little higher than the year before, advances being made on lime, cement and bricks. Lumber ruled about as the year previous. There will probably be no advance in wages this year, and little, if any, labor trouble.

MASONRY.

Masonry and Stone Cutting.

(Continued from page 60, March.)

Sharp acute arrises are to be avoided, and therefore we must leave a ledge of 3 inches above the upper arris of the voussoir where it intersects the vault. On the exterior of the wall the vertical arris is also sharp, and it will be advisable to leave there also some thickness of stone to form a joint of about 3 inches, perpendicular to the face of the wall; but in this case it is less important, as this joint will not be subjected to any pressure. The left-hand side of the archway and jamb in A will also present an acute angle, which one might cut off after the work was up. But this will hardly be necessary, as our construction would only be adopted in practice when the wall is only slightly oblique; if the obliquity were great the archway would have to be composed of two vaulted surfaces meeting in a groin, as in Fig. 21. This structure we shall learn to deal with when studying the groin at the meeting of two cloisters.



Masonry and Stone Cutting.—Fig. 22.—Construction of Hemispherical Cupola.

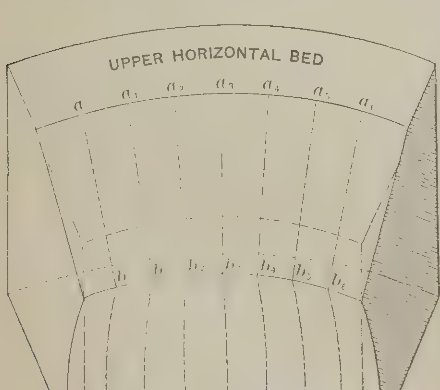


Fig. 23.—A Voussoir of the Lowest Course.

Construction of a Hemispherical Cupola.—In this structure, Fig. 22, the bed-joints follow parallels of the sphere, whereas the vertical joints follow the direction of the meridians. Our elevation presents a section of the cupola by a meridian plane; the projections of the bed-joints appear therein as horizontal lines, and the projections of the vertical joints form elliptical curves. The surface of any vertical joint is a plane, but the surface of a bed-joint is a cone with its apex in the center of the sphere; in short, a voussoir of the cupola, such as the one of elevation L′ M′ N′ P′, may be considered as engendered by the section L′ M′ m' l' round the axis O′ Z′ of the cupola.

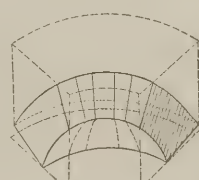


Fig. 24.—Voussoir of the Higher Course.

Operations for Cutting the Voussoirs.—For the lower courses a stone prism may be selected, the base of which contains the plan of the voussoir, and the hight of which is equal to the hight of the voussoirs measured on the elevation. In Fig. 23 we have shown how the voussoirs of the lowest course are cut; the circular outlines of the lower horizontal bed and of the upper bed of these voussoirs can be easily drawn with the help of molds reproducing the plan; then, by connecting the upper bed of the stone with its lower bed by chisel drafts, following the lines of the plan drawn thereon, the prism will be transformed into a slice of a ring, the outside and inside of which are cylindrical surfaces. On the interior cylinder, with the help of a flexible straight-edge, we draw the interior arris of the upper conical bed; this done, we have the two circles which limit the upper bed, and we can work the conical surface thereof with the help of a straight-edge. To guide the straight-edge the points of division $a\ a_1\ a_2\ a_3$, &c., $b\ b_1\ b_2\ b_3$, &c., taken from the plan of the voussoir, should be marked on the circular arrises of the upper bed. With similar datum points $b\ b_1\ b_2$, &c., $c\ c_1\ c_2$, &c., marked on the upper and lower arris of the soffit, the surface of the soffit can be worked with the help of a templet cut to the main section of the sphere.

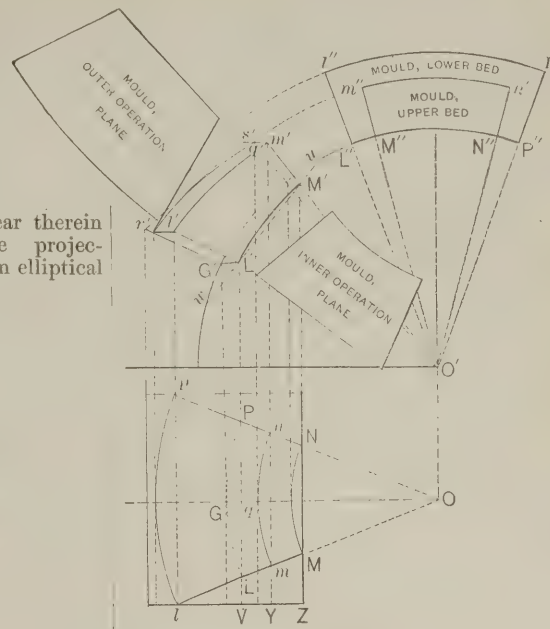


Fig. 25.—Operation of Cutting the Higher Voussoirs.

All these operations are very easy; but, when applied to the higher courses of voussoirs they involve an enormous loss of stone, as we have shown in Fig. 24. To save as much stone as possible we make, Fig. 25, a projection of the voussoir on a meridian plane passing through its center. Then we cut out a stone prism, of which the polygon G′ L′ M′ m' s' r' is the base; and, measuring from the base of that prism the distances V L, Y m, Z M, see plan, we get four points, which allow of our working the planes of the vertical joints. On the upper surface m' s' of the prism (see elevation) we draw the arc $m\ g\ n$ (see plan), and, by means of the mold of the inner operation plane L M N P, we draw on the inner face of the prism its intersection by the conical surface of the upper bed. Guided by the two curves last delineated, with datum marks thereon, we can work the conical bed with the help of a straight-edge.

Fig. 26.—Bevel.

Fig. 27.—Templet.

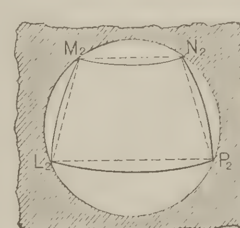
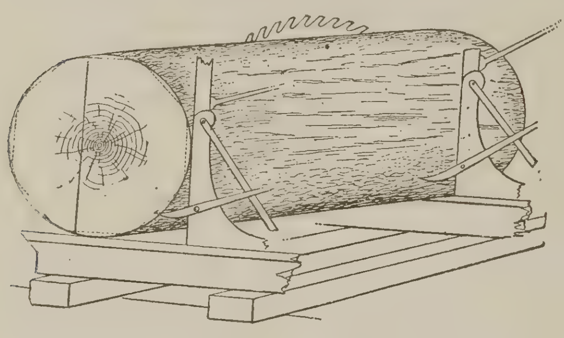


Fig. 28.—Position of Angles.

(To be Continued)

Quarter Sawing.

The very general use of quarter-sawed lumber at the present time in fine cabinet work, in furniture construction and for other purposes lends special interest to the term "quarter sawing," both with respect to its definitions and to explanations of how timber may be cut to be entitled to the term. Several of the journals devoted to the lumber trade have given this matter attention from time to time, and some time since we presented an article bearing upon this subject. Quite recently the St. Louis *Lumberman*, a new paper to enter the field, has gathered together a number of facts relating to quarter sawing and has presented them in a way to be of interest to our readers as well as to lumbermen. The article is virtually a compilation of what several authorities have said on the subject. At the outset our St. Louis contemporary quotes from the *Lumber Trade*



Quarter Sawing.—Fig. 1.—The Rough Log Upon the Carriage.

Journal as follows: "The first demand is to obtain lumber sawed from the sap to the heart; second, to obtain this as wide as possible; third, these results must be secured with a minimum of waste. Any method which attains the first result at the expense of the second, and especially the third, cannot be profitable to the manufacturer." This journal then goes on to say that from a manufacturer in Indiana, whose quarter-sawed oak is among the widest and best stock sold in the Chicago market, and therefore commands the highest

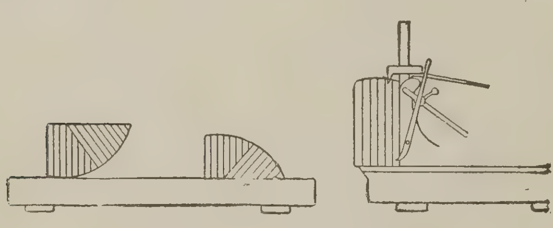


Fig. 3.—Cutting the Larger Portion.

prices, there has been secured the diagrams shown in Figs. 1 to 4 inclusive. The first represents the rough log upon the carriage, showing the top saw in its progress through the cut. The manufacturer referred to is quoted as saying: "It is a good plan to take off four or eight slabs, as this provides a flat surface for the head block in nearly all the subsequent manipulations. As we have an under dog with which we can hold the segments of the log in any desired position we usually take but the four slabs at first. After bringing the log as near to octagon as it is possible, the next operation is to split near to the heart, as shown in Fig. 2, laying off the smaller half upon the railway skids. The large half is then turned down and a section taken off, as shown in Fig. 3, which is also thrown upon the skids. The part remaining is then sawed up by the wide cuts so long as a proper figure can be obtained. Then the balance of the section is

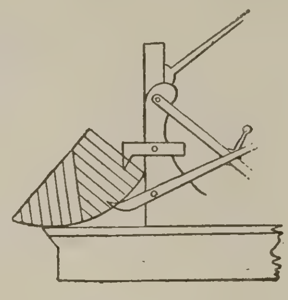


Fig. 4.—Cutting the Smaller Sections.

thrown on its back and sawed from the corner to the widest part of the quarter, and then, again turning with the flat side to the knee, work is commenced on the corner and finished up. The other sections are then placed on the carriage and the same course pursued with them." This manufacturer concludes with the statement that he does not find it profitable to use logs less than 26 inches in diameter for quarter sawing, and prefers those of 30 inches and over. Something over a year since *The Southern Lumberman* treated the same subject and presented the following: "This demand (for quarter-sawed lumber) is based mostly on the fact that lumber of any kind cut in this manner shrinks less and warps

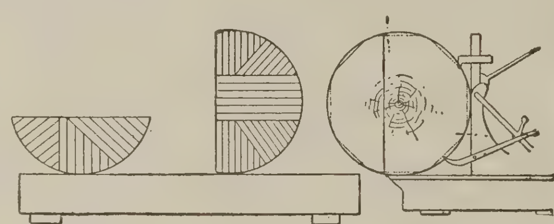


Fig. 2.—First Operation, Splitting Near the Heart.

less than that sawed in the usual manner, and is really more valuable for nearly all purposes, but its popularity is also due, in some measure, to the fashion that is gaining prevalence for figured oak and other Southern hardwoods for interior finish, for panels, furniture and many other uses. It is one of the most sensible fashions everstarted, because it is a well-known factthat the greatest shrinkage in any lumber is in the direction of the periphery or circumference of the tree, and the least

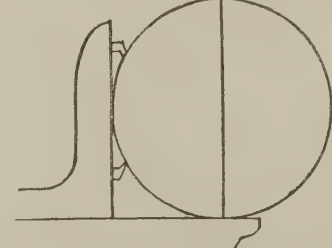


Fig. 5.—The Second Method.—First Cut, Halving the Log.

shrinkage and slightest warping is in a line 'with the grain' from the bark to the heart of the tree. To cut lumber as nearly like clapboards or staves are riven, with the least possible loss of timber, is the object of 'quarter sawing.' The most desirable feature is to secure clearness and width. None but the best logs, 14 or 16 feet, should be cut if the highest prices

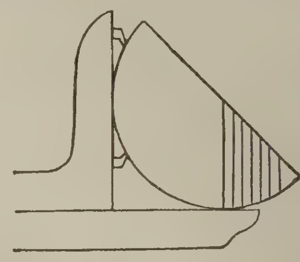


Fig. 6.—Second Cut, an Eighth into Boards.

are expected. The width should never be under 5 inches, and the wider it is the better. All boards should be cut 'full', so as to dry up to full thickness. The best thickness is 1 inch to 2½ inches. Thick lumber com-

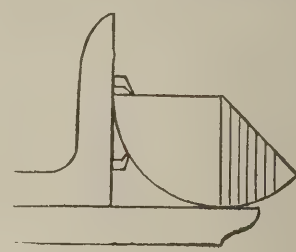


Fig. 7.—Third Cut, Another Eighth into Boards.

mands $3 to $4 per thousand more than boards, but the demand is yet limited for thick stuff, and it requires more time to season. Our experience is that it is better to dry quartered oak before trimming on

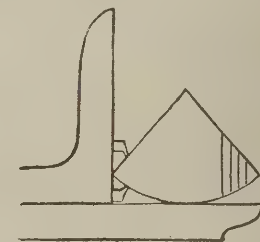


Fig. 8.—Fourth Cut, Another Eighth into Boards.

the bevel edge and the sap, as this plan gives a more perfect board; but it costs more, and some good mill men differ with us. The diagrams (Figs. 5 to 9) are from the rough pencil sketches sent us by prac-

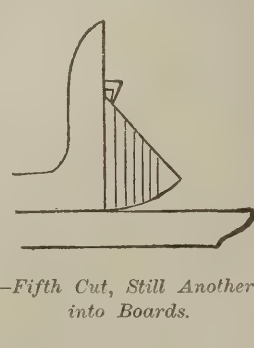
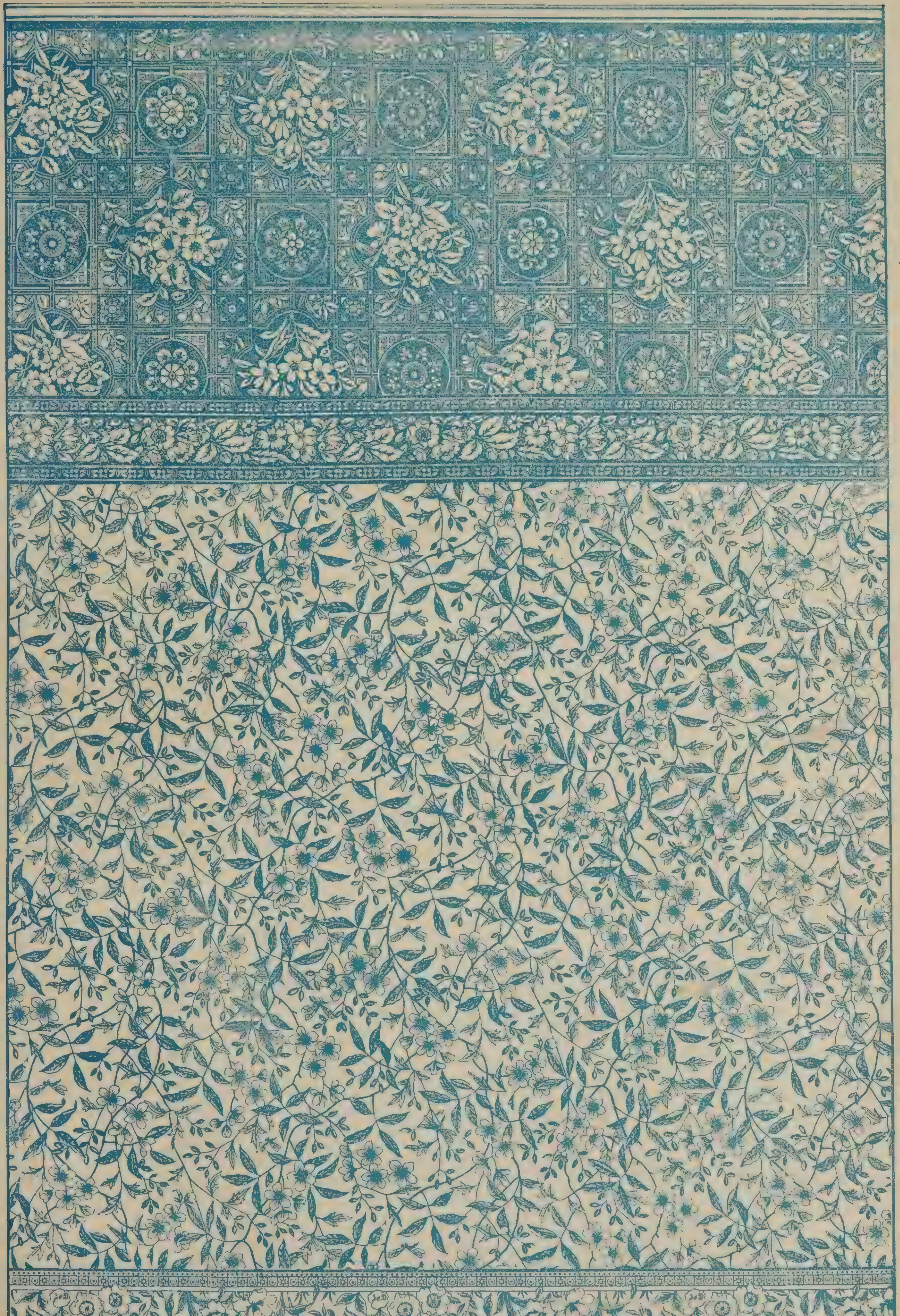
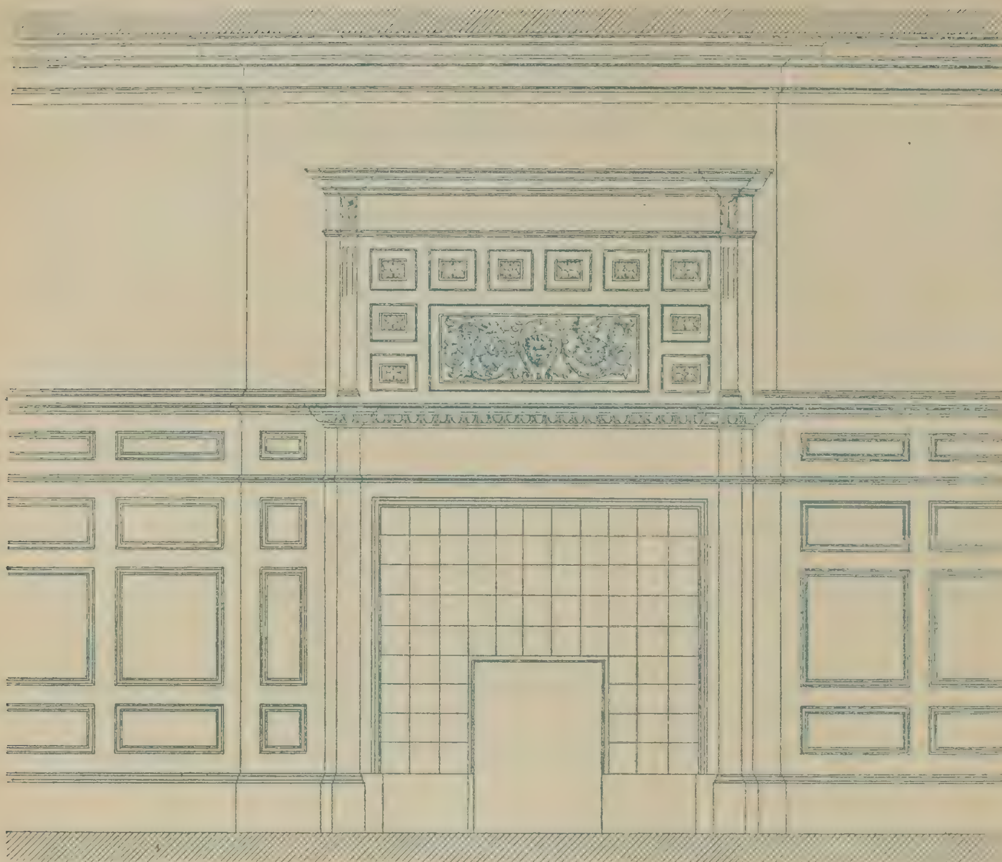


Fig. 9.—Fifth Cut, Still Another Eighth into Boards.

tical saw-mill men, and the descriptions are given in their own language. Following are the best-known plans for cutting quarter stuff: First cut, halving the log; second cut, an eighth into boards; third cut, another eighth into boards; fourth cut, another eighth into boards; fifth cut,



MODERN WALL PAPER DESIGN.



DETAIL OF MANTEL SHELF.

Scale, 3-4 Inch to the Foot.

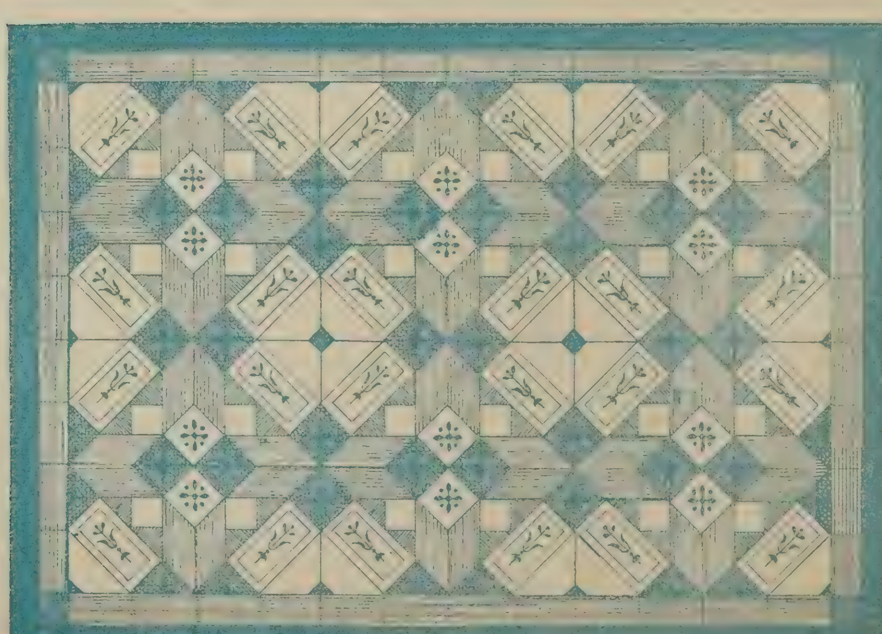
CHIMNEY PIECE IN FRONT HALL. Scale, 3-8 Inch to the Foot.

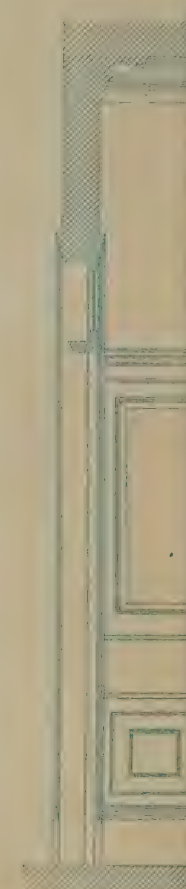
Details of House in West 82d Street, New York.

(For Floor Plans, etc., see March issue.)

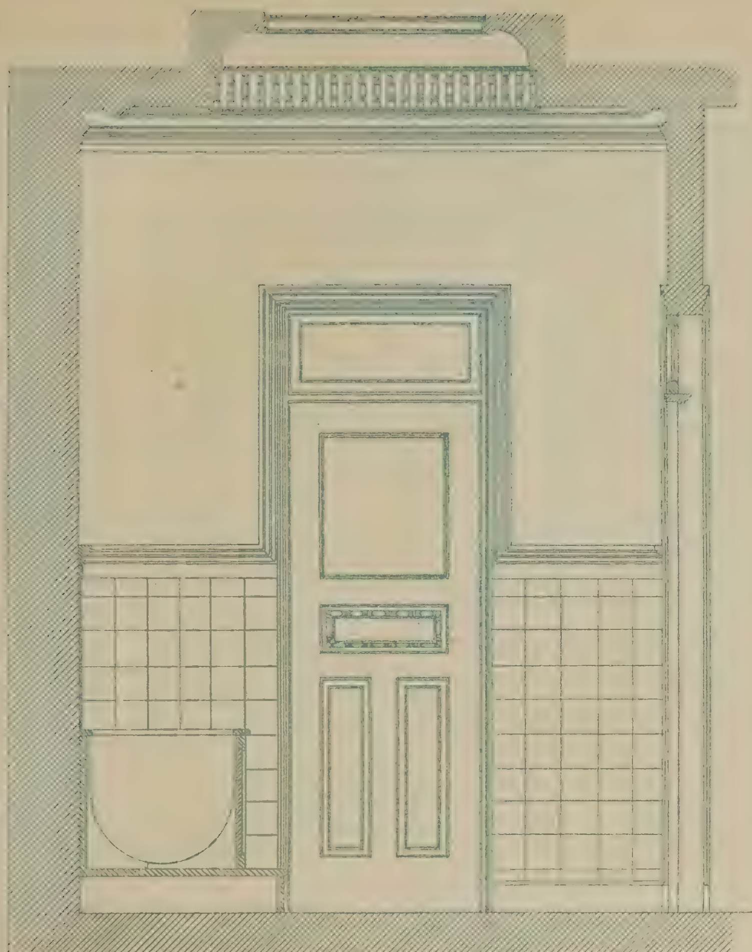
EMANUEL GANDOLFO, Architect.

V. DEL. GENOVESE, Builder.



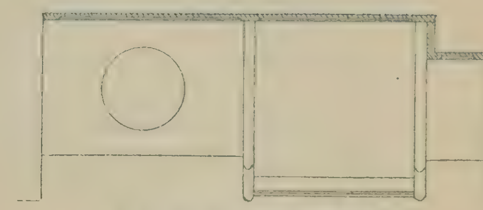


Design of Parquetery Flooring by R. Fischinger.

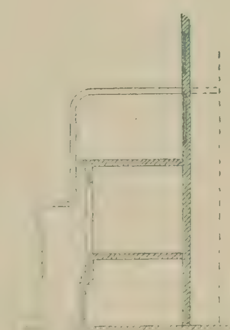


TRANSVERSE SECTION THROUGH BATH ROOM.

Scale, 3-8 Inch to the Foot.

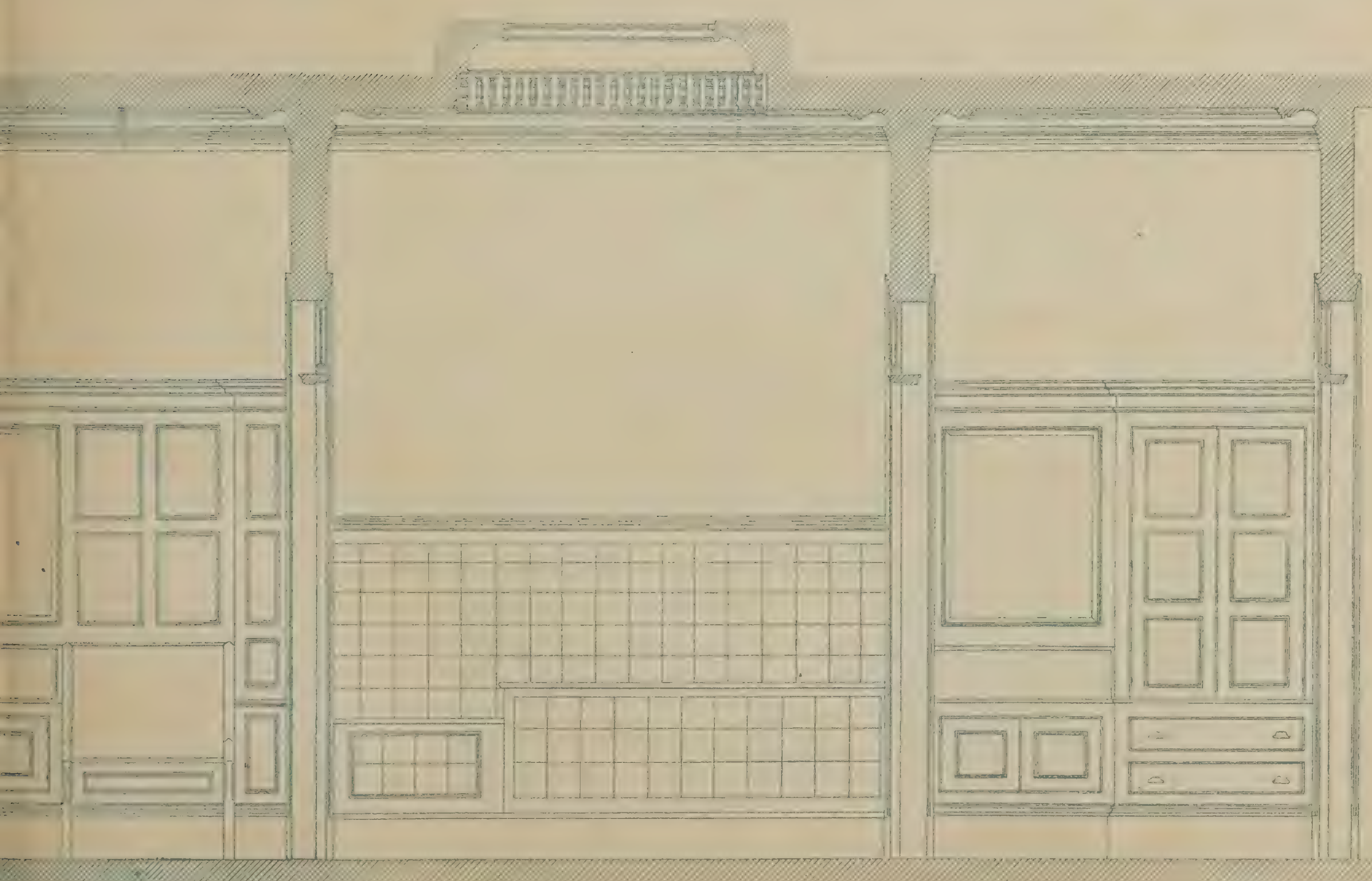


PLAN OF BASIN AND SITZ BATH.

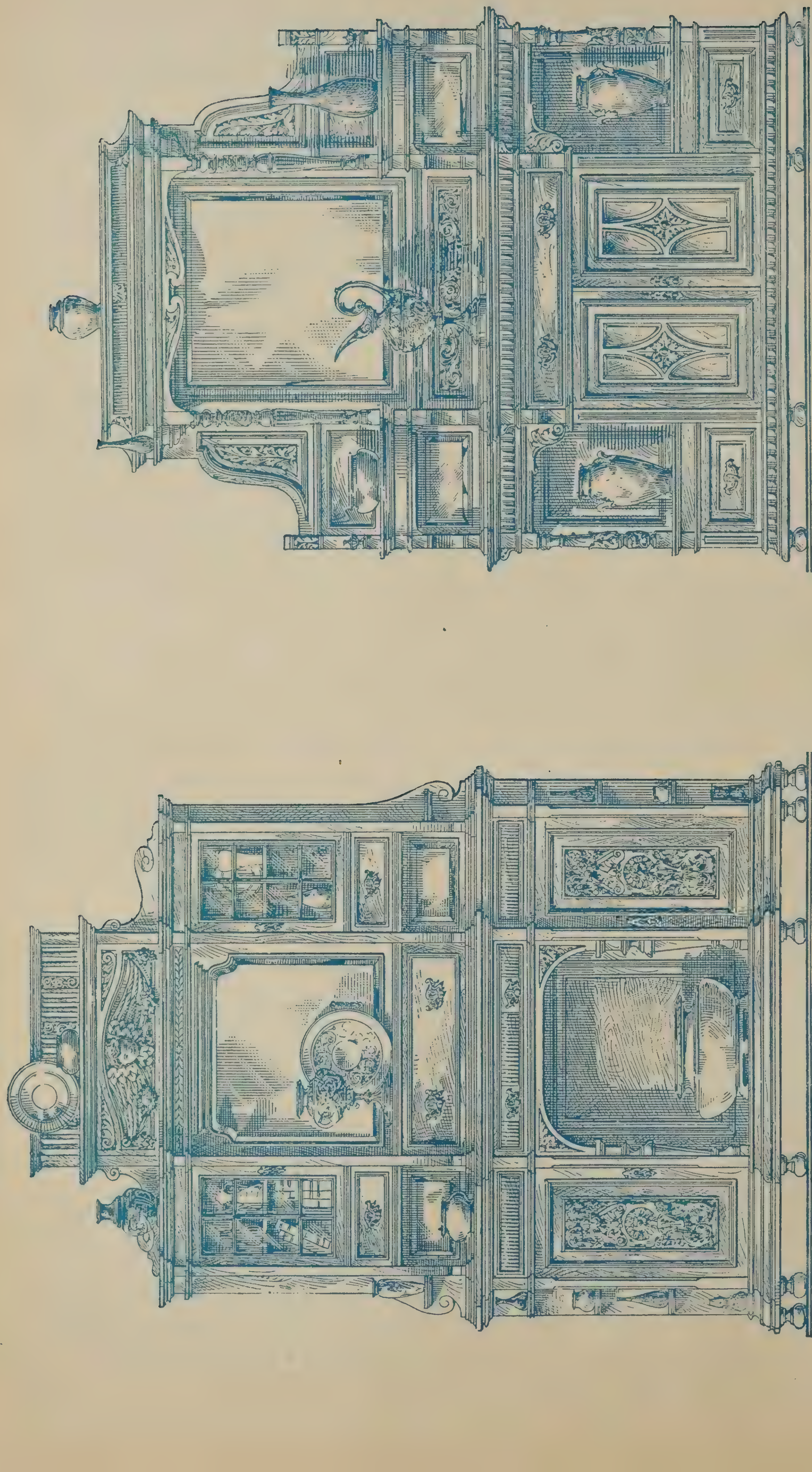


End Elevation of Sitz Bath.

Section through Sitz Bath.



ELEVATION OF SIDE OF BATH ROOM. SCALE, 3-8 INCH TO THE FOOT.



DESIGNS FOR SIDE BOARDS. STYLE, ENGLISH RENAISSANCE.

another eighth into boards. The other half of the log is cut in the same manner."

The same authority presents the diagrams shown in Figs. 10 to 15 inclusive, representing the work of a saw-mill man

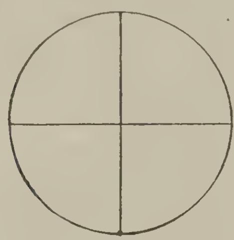


Fig. 10.—The Third Plan, Quartering the Log.

in Ohio. Fig. 10 shows a full log and the way it is quartered. Fig. 11 shows a quarter and the way it is sawed for quarter sawed. Fig. 12 shows a log cut in the

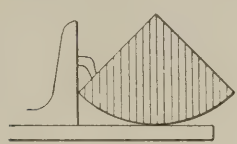


Fig. 11.—Sawing a Quarter.

way it should be sawed in order to get it "grain-sawed." Fig. 13 shows a grain-sawed board and the way it would warp. Fig. 14 shows a board warped at the

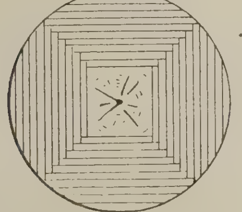


Fig. 12.—Cutting a Log to Secure Grain-Sawed Lumber.

center only, which illustrates itself. Fig. 15 shows a board sawed directly through the heart; such a board will not warp, but is liable to burst at the center. It will not shrink in width, but will get thinner. Since boards have a tendency to warp in the direction of the bark, quarter-sawed lumber should never be edged up until it is seasoned. The diagrams shown in Figs. 16 and 17 illustrate the work of an Indiana sawyer, and for which we are indebted to the same source, as already noted. Fig. 16 represents a log that is quartered by sawing through the center first and then splitting the halves in the center. Each quarter is laid on the blocks with the bark set down, and is sawn as represented in the drawing. Fig. 17 represents a log that is too small to quarter. The part that is not lined off is sawed as the sawyer may wish. The balance, is the manufacturer says, if sawed as represented in the drawing, will sell as quartered lumber; for it is

Fig. 13.—The Warping of a Grain-Sawed Board.

Fig. 14.—Board Warped at the Center.

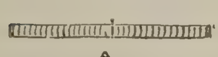


Fig. 15.—Board Sawed Through the Heart.

plain to be seen that it will show the grain or figure, as if the log had been quartered.

Figs. 18 to 22, inclusive, show the ideas of another Indiana firm of sawyers. These drawings indicate a method which this firm say they have used for years with great satisfaction. The log is first cut as shown in Fig. 18. It is then cut as indicated in Fig. 19. The sawing of the different parts is indicated in Fig. 21, which is derived from C in Fig. 19. After the boards indicated in Fig. 21 have been cut off, the remaining part is managed as shown in Fig. 22. The heart of the timber in this case is made into a 6 x 6 timber.

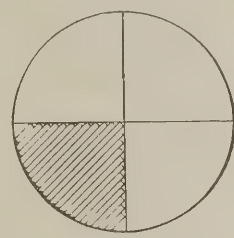


Fig. 16.—The Fourth Method.

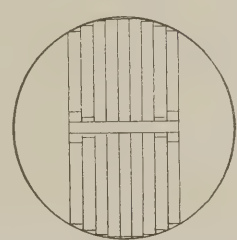


Fig. 17.—Plan of Sawing a Log that is Too Small to Quarter.

The Barney & Smith Mfg. Company, of Dayton, Ohio, well-known makers of railway cars, some time since issued directions to sawyers with reference to lumber to be cut in order to meet their requirements. The plan of sawing edge grain flooring which they sent out at this time is shown in Fig. 23. The directions are as follows:

Fig. 18.—The Fifth Plan, Cutting by the Octagon Method.

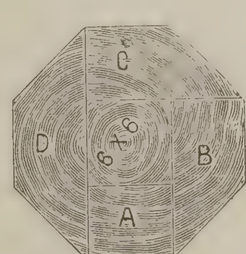


Fig. 19.—Subdivisions of the Log.

"First, square the log; 8 inches face heart. Then saw lines 1, 2, 3, 4 and 5, after which rip up cants A and B together."

Grained sawing, which has been referred to in what precedes, should not be confounded with quarter sawing. In the former it will be seen that the object is to saw all around the log in order to bring out the beautiful grain which can be produced only by bastard sawing. Grained lumber, as we need scarcely inform our readers, is unfit for floors or wearing surfaces, because it parallels the circles of growth, which have a tendency to separate the one from the other. Quarter sawing cuts the medullary rays at right angles with the circle of growth, leaving the edges of the rays disintegrated, so to speak, upon the surface. These being the hardest or "horny" portions of the wood growth, not only remain solid under frictional wear, but present a beautiful mottled appearance highly prized in finished wood.

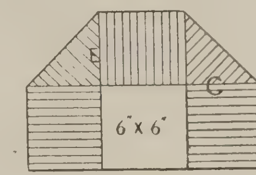


Fig. 20.—Cutting into Boards, Heart Omitted.

Care of Timber.

As a rule, too little attention is given to the care of timber. Writing upon this subject, G. R. Burnell says:

From the day when wood is felled to the day it is used it requires care and attention, and, when it is in place, precautions should still be taken to insure its durability. Currents of air which are either renewed with too great rapidity or are too dry, a temperature too elevated, constant moisture at high temperatures, alternations of dryness and humidity, absence of ventilation producing wet rot, the accidental transport by the atmosphere of the seeds of certain cryptogamous plants producing dry rot, and the attacks of insects, together with the fermentation of the sap of the trees, may be cited among the numerous sources of danger from which it is necessary to secure wood either when in store or when employed. When wood is exposed to frequent currents of air, especially at high temperatures, the moisture it contains evaporates too rapidly, and gives rise to cracks and fissures, which either destroy the resistance of the material or open a passage for the water contained at other times in the atmosphere to penetrate to the

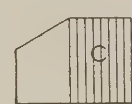


Fig. 21.—Cutting C and B of Fig. 19.

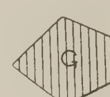


Fig. 22.—Finishing Cuts.

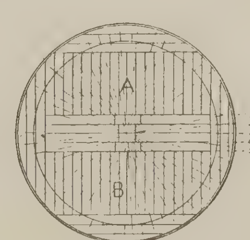


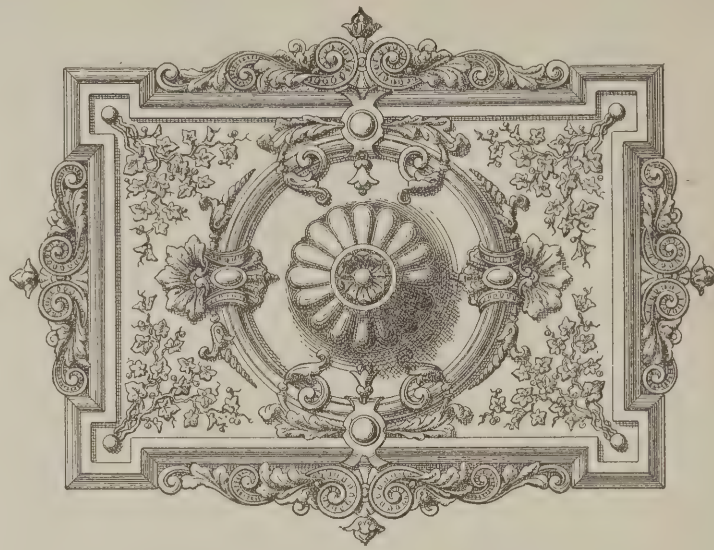
Fig. 23.—Sawing Edge Grain Flooring.

interior of the mass. If the temperature to which wood is exposed while any sap remains in it is too elevated, the vegetable fluids ferment, the tenacity is diminished, and when the action is carried to its full extent the wood quickly becomes affected by the dry rot. Exposure to the atmosphere in positions where rain can lodge in quantity, contact with the ground, and application in damp situations deprived of air, will render wood liable to the wet rot; and however well seasoned it may have been previously to being brought within the influence of any of these causes, it will infallibly suffer. It is, therefore, of the highest importance that, whether in the merchants' stores, or subsequently when placed in a building, wood should be preserved from contact with the ground, and that air should have free access to it in every direction. The germs of destruction are often communicated while the wood is in store from neglect of these simple precautions; if they be once implanted the progress of decay can never be subsequently arrested.

It has been supposed that keeping wood in water tends to prevent the commencement of dry rot, because in that position the sap is washed out of the pores. If this theory is correct it must be evident that the oftener the water is changed the greater will be the probability of its producing the desired effect, because if it be allowed to stagnate it must become saturated with the sap in course of time and unable to take up any additional quantity which may be present. Duhamel observed that if wood were immersed immediately after it was felled it would be less liable to decay than if put in water at a subsequent period; he also found that immersion tended to preserve the wood from the attacks of insects, and even to arrest the progress of some kinds of decay, but that a notable portion of the strength was lost. The drying and seasoning take place with greater rapidity after immersion, probably because the water displaces the sap, which does not evaporate so rapidly as the thinner fluid. Duhamel asserts that the process of charring the ends of posts, &c., built into the ground is very inefficient, and that it is only of use to the extent of interposing an extraneous substance between the wood and the earth. In his opinion it would be better to inclose the lower ends in sand, stone, cinders or other materials which would easily carry off the water supplied by the surrounding media. This practice should prove efficient, and it would be well to follow it wherever it is practicable.

Sheet-Metal Center-Pieces.

The cuts on this page are selections from designs prepared for a new catalogue



Sheet-Metal Center-Piece, No. 2283.

shortly to be issued by Bakewell & Mullins, of Salem, Ohio, and represent sheet metal center-pieces. The fashion of decorating or enriching the centers of ceilings around chandeliers with relief ornamentation is being revived at present. Many objections can be cited against the stucco and plaster centers which have long been in vogue. Many advantages pertain to the use of sheet metal for the purpose, and the firm above mentioned, with the idea of supplying a well-defined demand in this regard, have prepared some very tasteful designs and propose to manufacture a full line of these goods. For the convenience of those who examine this work we have appended the catalogue numbers.

Sheet-Metal Center-Piece, No. 2288.

Sheet-Metal Center-Piece, No. 2285.

THE *American Architect* mentions a device of some value for promoting the efficiency of that simple fire-extinguishing apparatus, a pail of water. A mill manager who had found it difficult to keep the fire-pails filled and in order, recently fitted up the hooks carrying the pails with pieces of spring steel strong enough to lift the pail when nearly empty, but not sufficiently so to lift a full pail. Just over each spring, in such a position as to be out of the way of the handle of the pail, was set a metal point connected with a wire from an open-circuit battery. So long as the pails were full their weight, when hung on their hooks, kept the springs down, but as soon as one was removed or lost a considerable portion of its contents by evaporation the spring on its hook would rise, coming in contact with the metal point, thus closing the battery circuit and ringing a bell in the manager's office, at the same time showing on an annunciator where the trouble was. As the bell continued to ring until the weight of the delinquent pail was restored it was impossible to disregard the summons to attend to it.

CORRESPONDENCE.

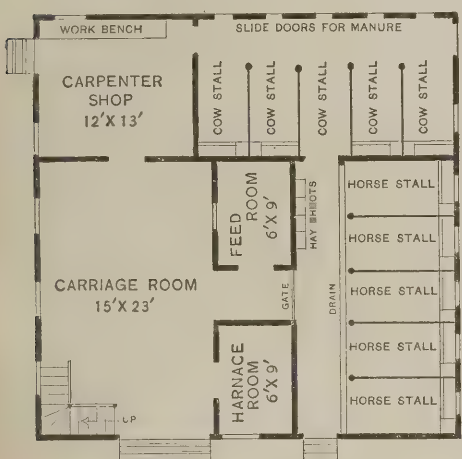
The Word "Plane."

From L. H., *St. Paris, Ohio.*—One of your correspondents in the February issue asks for an explanation as to the origin of the word "plane." So far as I have examined into the matter, I have been unable to determine when the plane was first suggested; however, the following item may be of interest to the readers: In the prophecy of Isaiah xliv., 13, the statement is made that "the carpenter stretcheth out his rule; he marketh it with a line; he fitteth it with planes and marketh out with the compass, and maketh it after the figure of a man." This traces the word back 712 years B. C.

Note.—Our correspondent's reference to a mention of the word plane in King James's translation of the Scriptures will, no doubt, prove of interest to our readers. The original intent of the inquiry, if we mistake not, to which this is a partial reply, was not so much the word plane as the origin of the tool which we call by that name. What tools the ancients had to take the place of what the modern wood-workers call a plane was also involved. Perhaps some of our readers who have investigated the subject may be able to add to the information above.

Frame Barn.

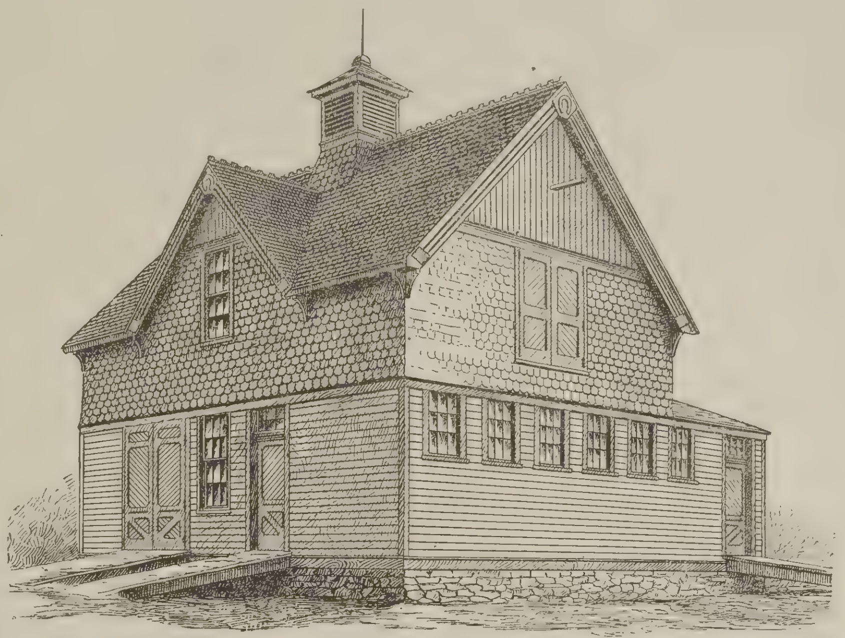
From Louis Miller, *Arcadia, Mo.*—I inclose you a photograph and ground plan of a barn that I built a short time since



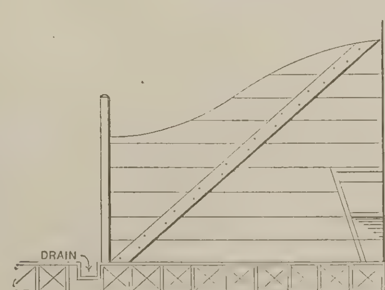
Frame Barn.—Plan.—Scale, 1-16 Inch to the Foot.

for General Turner, of St. Louis; the cost was about $1200 complete. I hope that you can make use of it in *Carpentry and Building.*

Note.—It gives us pleasure to lay before our readers at this time the engravings made from a photograph of the barn which Mr. Miller incloses to us, and also the ground or floor plan showing the interior arrangement. The latter so clearly explains itself that no description is necessary. In the third engraving presented herewith is given a section showing the arrangement of the horse stalls.



Design for Frame Barn.—Contributed by L. Miller, Arcadia, Mo.



Section Through Horse Stall.

Framing Roofs.

From F. L., *Portland, Me.*—Referring to the letter from "T. D. G.," Council Bluffs, Iowa, and to the roof-cutting correspondence in general, I would say that I have been the foreman of a gang of framers and carpenters for several years past, and that if I should attempt to frame a hip roof by the method of your Western correspondent, I should be laughed off the job. I agree with the correspondent in Cincinnati, whose letter was published in a recent issue, that the perusal of trade journals is both beneficial and remunerative. I have derived great benefit from *Carpentry and Building* during the last five years.

Jerry Building in Kansas.

From F. N. C., *Lyons, Kan.*—Quite recently, through the kindness of one of your subscribers, we were shown a letter published in the September issue, under the initials "D. P. D.," and which was replied to, on general principles, by an Ohio man. Your correspondent writing from this point is well known to us, and, contrary to the inference that would be drawn from his article, put up some very acceptable buildings in this city during the year just past. However, they were by no means as fine as a number of others built by different parties. Western towns, and especially Kansas towns and cities, are noticeable for the preponderance among their residences of those of elegant design, superior finish and good workmanship. Many dwellings have private gas plants, private water systems, hot-air furnaces or steam heaters, and put on many metropolitan airs, all of which are secured at much greater cost than the same work would involve if built in a city having city advantages. We were surprised that a young man who has gained a good livelihood in this locality during several years past, who has accumulated a little property and has become identified with the growth of the place in however small a way, should allow himself to pose for a moment as a misanthrope. It was well for him that his communication was addressed to a journal published as far away as New York, for no periodical in this section of the country would have given his communication a moment's consideration. We want to state, for the benefit of your readers, that "jerry" building is no more common in the cities of Kansas than in any of the Eastern cities The communication of "D. P D." was a gross injustice to Lyons in particular and to Kansas in general. Good mechanics in this section have always commanded the best of wages. The price of wood workers ranges from $2.50 to $3 per day; bricklayers from $5 to $6, and stonecutters from $3.50 to $4.50. These wages are paid by responsible and competent contractors, and were the ruling figures last year. I must say further that in business buildings and residences upward of $500,000 were expended in this city last year, and that, too, without a sign of "jerry" workmanship. The work done was such as many larger towns might well be proud of. In conclusion, I would say that Lyons has more fine, well built, handsome buildings, both residence and business blocks, with less "jerry" workmanship than any Eastern city with which I am acquainted.

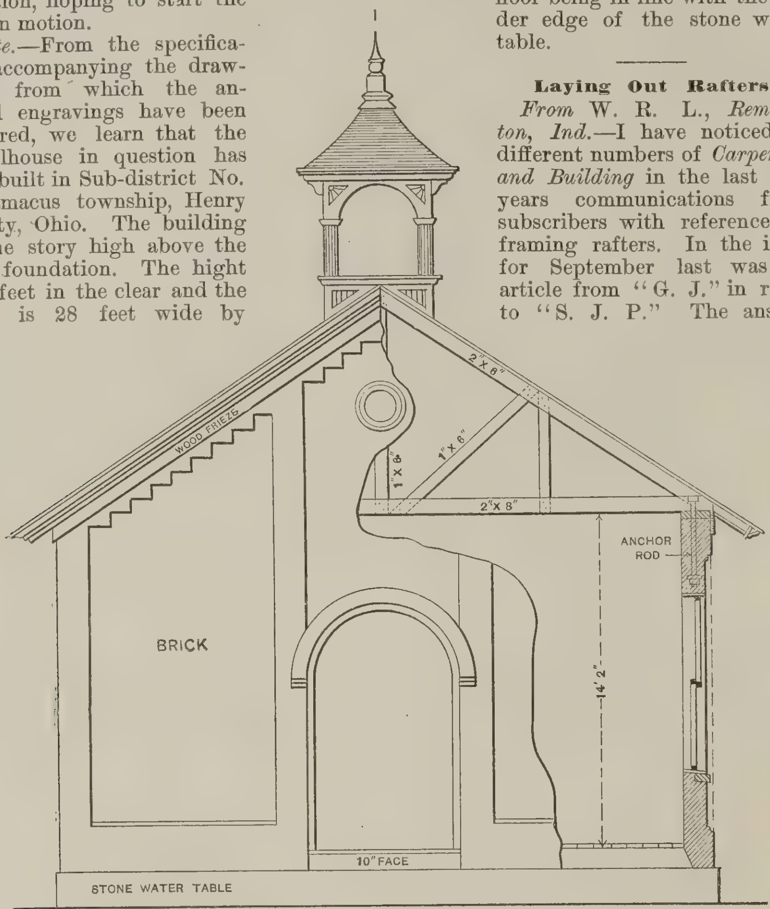
Note.—It seems to us a little strange that a communication written in good faith, apparently at least on a subject of such general interest to the building trade, should fail to attract attention for so many months as the letter above referred to. That it is now attracting attention is evident not only from the letter above published, but from what appears in a Kansas paper of recent date in the form of comments on the letter reprinted from our columns. From the latter we quote a few sentences:

"'D. P. D.' owes this vicinity an apology for the misrepresentations contained in the above, and should be ashamed of himself for stating what he must know to be absolutely false in the main. We challenge 'D. P. D.' to name a city the size of Lyons in the State of Kansas or out of it which has made a larger growth or more substantial improvements in the last year. To bring this about has cost much money, time and hard work. 'D. P. D.' can hardly expect those who have an interest in Lyons to sit quietly down and see it maligned."

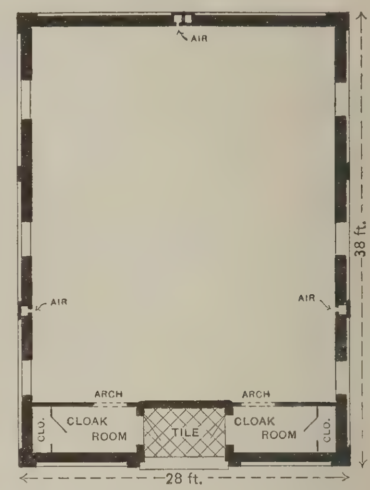
Country Schoolhouse.

From J. S. F., *Grand Rapids, Ohio.*—I inclose you elevation and plan of a cheap schoolhouse. I also send the specification which affords full explanation. I shall be glad to see country schoolhouses and churches discussed in *Carpentry and Building*, and I send this as a contribution, hoping to start the ball in motion.

Note.—From the specification accompanying the drawings, from which the annexed engravings have been prepared, we learn that the schoolhouse in question has been built in Sub-district No. 5, Damacus township, Henry County, Ohio. The building is one story high above the stone foundation. The hight is 14 feet in the clear and the room is 28 feet wide by 38 feet long. The walls are of brick 14 inches thick to the hight of five or six courses above the base, from which point the walls are 10 inches thick between pilasters, the pilasters being same thickness as the base course above mentioned. One chimney is located at the rear end of the building, and is provided with two flues, one for ventilation and one for connection with the stove. Each are 6 x 8 inches in the inside. The chimney commences on the stone foundation. An air flue is also located on each side of the house in pilasters, as shown in the plan. Each flue is provided with an exhaust register placed in the wainscoting near the floor on the inside. An escape register is also placed in the cornice near the roof on the outside. Floor joists are specfied 2 x 10 inches, thoroughly bridged. The flooring to be of white ash 1 inch thick by 3 inches wide. The roof frame is to be self-supporting in character, the construcof which is indicated in the drawing. The roof is covered with first quality purple and unfading green slate, 9 x 18 inches in size. The window sills are of cut Berea stone. The door frames are 1¾ inches pine planks. The doors are 1¾ inches thick, also of pine, hung with loose pin butts. The windows are provided with outside blinds, with rolling slats. Arches are turned over all windows and doors; the wainscoting is specified 3 feet high, to be of selected white ash, perfectly seasoned and carefully matched. Above the wainscoting the walls are plastered. A portion of the wall is finished so as to afford a blackboard surface. A blackboard 20 feet in length is also provided of best Pennsylvania natura blue slate stone. In the cloakrooms, on either side of the vestibule, cupboards are provided, which are shelved. The cloakrooms are provided with appropriate hooks for hats and coats. The front of the house is finished with a porch 28 feet long, 6 feet wide, the top of the floor being in line with the under edge of the stone water table.



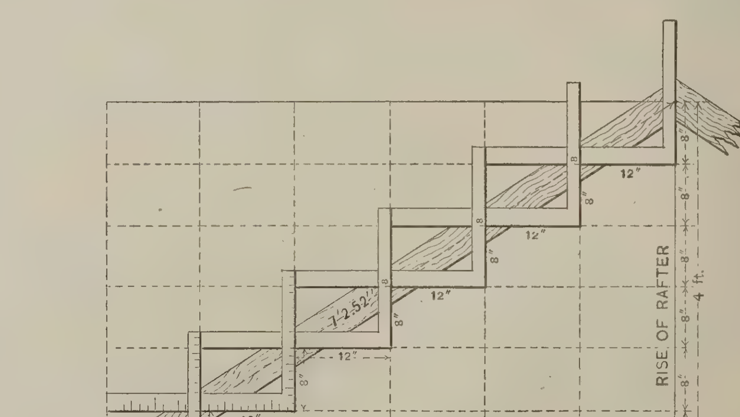
Country School-House.—Elevation and Section.—Scale, ⅛ Inch to the Foot. Contributed by J. S. F.



Plan of School-House.—Scale, 1-16 Inch to the Foot.

Laying Out Rafters.

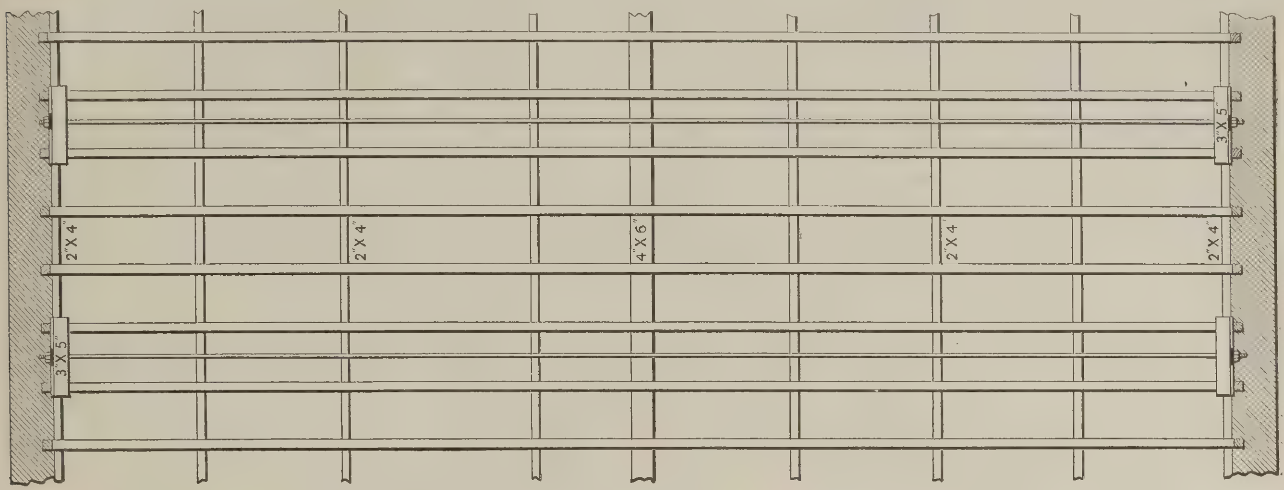
From W. R. L., *Remington, Ind.*—I have noticed in different numbers of *Carpentry and Building* in the last few years communications from subscribers with reference to framing rafters. In the issue for September last was an article from "G. J." in reply to "S. J. P." The answer of your correspondent is undoubtedly correct, but what many mechanics want is plain framing with as few figures as possible. The rafter, as well as all other parts of the frame, can be laid off without any figuring, especially such calculations as extracting the square root, which are seldom understood by mechanics, simply by using the steel square. The rule or method that I employ is not new by any means; it is given in different works on carpentry, and has, in part, appeared in back numbers of *Carpentry and Building.* I have never seen it in print, however, so fully described as I propose presenting it at the present time. What is generally omitted are the relations of the figures on the steel square to the run or rise of the rafter. By simple measurement, the same as you would measure the length of a scantling, only holding the square in the proper manner as to bevels and running it the same number of times as there are feet in one-half the width of the building, the rafter is laid off correctly, and that, too, in one-half the time required to make the calculation by figures. In the sketch which I inclose I have tried to illustrate this method. It seems to me, at least, so simple that any one trying it will never afterward use figures to get the length of the rafter. The illustration shows a rise of 4 feet or 48 inches in a run of 6 feet or 72 inches. The square is applied upon a line representing the center of the rafter, and shows the length from the center of the ridge to the top of the plate. By the conditions of the problem the rise of the rafter is 8 inches to every 12 inches of run; accordingly 12 of the blade is taken to 8 of the tongue on the length of the rafter, as shown in the diagram. Any other number of inches to the foot can be obtained in the same manner. Hip and valley rafters can be got in the same way, simply taking the rise in inches on the tongue and 17 inches on the blade, running the same number of times as for the straight rafter. The reader in making use of this plan should always remember to run the gauge as far down the rafter as notched. The measure-



Laying Out Rafters.—Diagram Accompanying Letter from W. R. L.

ments are made from the top corner of the plate. The example shown illustrates third pitch.

Note.—Our correspondent's reference to hip rafters above and the use of 17 inches on the blade we think will be readily understood by our readers, especially those who remember the discussion of the same method in back issues of the paper. The rule in this respect is only approximately correct; but it differs so little from being absolutely accurate that it would not be noticed in ordinary work. If the reader will take 12 on the blade and 12 on the tongue of his square, and lay his rule across, he will find that the length of the diagonal, as nearly as it can be measured with ordinary appliances, is 17 inches.

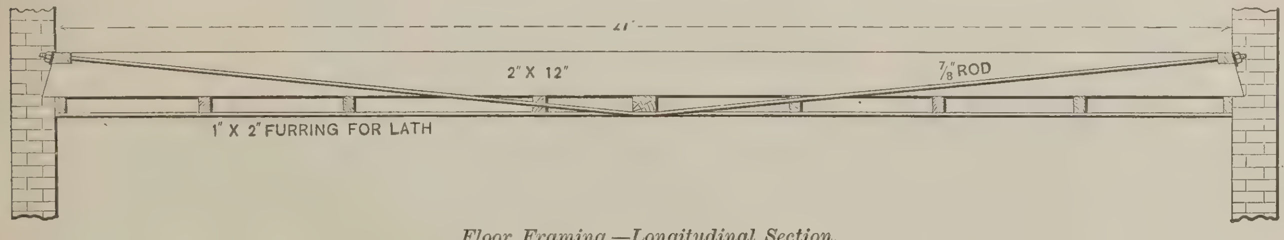


Floor Framing.—Plan Illustrating Method Suggested by C. R. J.

Floor Framing.

From C. R. J., *Georgetown.*—I inclose a sketch for the framing of a floor of a lodge room. The room below the lodge chamber is to be used for a store. The span is 27 feet in the clear. The joists are 2 x 12 with an under girder 4 x 6 inches, carried by ⅞-inch truss rods. These are placed 5 feet 4 inches between centers and are supplied with oak head blocks, 3 x 5 inches, notched in the upper edge of two joists. Ceiling joists, 2 x 4 inches, are hung 36 inches between centers and are cross furred with 1 x 2 inch strips for lathing and plastering. The entire space occupied by the framing and flooring is 18 inches. I submit this plan for criticism upon the part of readers of *Carpentry and Building.* It is a scheme I would like to have considered with reference to strength, lightness and cheapness of construction.

Note.—The challenge that our correspondent lays down is of interest to many of our readers. He shows a plan of construction in which evidently he has faith, and as we understand him invites others who have as good or better plans to show them up. We shall be glad to publish a number of diagrams.



Floor Framing.—Longitudinal Section.

REFERRED TO OUR READERS.

Plan of Plain Frame Dwelling Wanted.

From J. T. D., *Lockport, N. Y.*—Will some reader of *Carpentry and Building* prepare a plan, with full details, of a neat dwelling house, frame, to cover cellar, consisting of parlor, 14 x 14 feet; sitting-room about the same size, sliding door between the rooms, bay-window in sitting-room and a large bedroom off the sitting-room. The kitchen should be about 12 x 12 feet with pantry communicating, and there should also be hall with stairs, the latter straight with half landing. There should also be back stairs from the kitchen. The whole house to cost about $1500. The upper story to be planned as may seem best. This is the kind of a house that is very frequently demanded, and it would certainly interest your readers if it were presented.

Deafening Office Doors.

From F. M. Co., *Bridgeton, N. J.*—Will you or some of your correspondents kindly inform us as to the best method of "deafening" office doors which separate the different rooms in an ordinary frame building, used for business offices? Of course, they can be made double, but this makes too much trouble in passing through, and it would be desirable to have the doors themselves, which are of pine 1½ inches thick, deafened by building them out with felt, air spaces or some other contrivance for deafening, with a view to prevent ordinary conversation being heard from one room to the other.

Learning a Trade.

It is scarcely necessary to inform our readers as a class that the opportunities for learning a trade at the present time are few and far between. The result of a careful search for an opening is almost always disappointment. A young man who set out in New York city a short time since to find the opportunity of acquiring a knowledge of some handicraft met with no success whatever, and finally addressed Mayor Hewitt a note, asking his assistance. The reply made by the Mayor has been given to the press for publication, and inasmuch as it gives a conception of the situation as viewed by a man prominent in industrial circles as well as high in office, it will no doubt be of interest to our readers. The letter in question is as follows:

Sir—I am in receipt of your letter of the 27th inst., in which you state that after making application to more than 50 employers to receive you as an apprentice, and having entirely failed to find an opportunity to learn a trade, you ask me to secure for you a place in which you can be instructed in some mechanical business. I am almost ashamed to say that I cannot give a favorable answer to your request. In this great city there ought to be abundant opportunity for every young man to learn a trade. Under the regulations adopted by the various trades unions, the number of apprentices is limited, so that there is growing up in our midst a large number of young men who cannot find access to any mechanical employment. This is a lamentable state of affairs, because these young men are turned loose upon the streets, and grow up in habits of idleness, resulting in vice and crime. If this action of the trades societies in this matter really limited the competition for employment which they experience, it might be defended, at least upon selfish principles; but, inasmuch as foreign workmen are free to come to this country in unlimited numbers, the only effect of these regulations is to keep our own young men out of useful employment, which is freely open to those who are born and trained in foreign countries. The evil is of the most serious character, and I trust that this statement of it may lead to a reconsideration on the part of the various trades organizations who now restrict the right of employment without benefit to themselves, but to the great injury of the rising generation. I shall give this letter to the press, in the hope that some master mechanic, who may be in a position to take you into his business, may send me his address, which I will then forward to you.

Yours respectfully,

Abram S. Hewitt, Mayor.

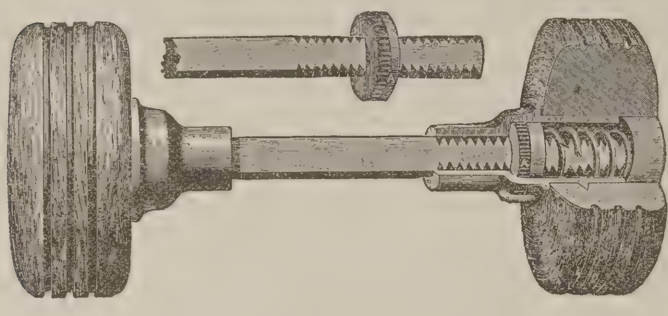
At last advices no master mechanic had come forward on the suggestion contained in the last clause of the Mayor's letter.

According to experiments mentioned in *Indian Engineering*, the tensile strength of a wet rope is only one-third that of the same rope when dry, and a rope saturated with grease or soap is weaker still, as the lubricant permits the fibres to slip with greater facility.

NOVELTIES.

Giant Door-Knob Fastening.

The Hollenbeck Lock and Knob Company, Syracuse, N. Y., are introducing an adjustable door-knob fastening, the features of which are clearly shown by Fig. 1 of the engravings. The spindle is so con-



Novelties.—Fig. 1.—Adjustable Giant Door Knob Fastening.

structed as to allow a nut, indicated by A in the engraving, to turn on the same. When the spindle is in place this nut is operated from the under side of the shank, The edge is milled so as to make it possible to turn it when necessary. A spring is provided in the handle which holds the nut in place when the spindle is entirely removed, to admit placing in the door. It also serves to prevent the nut from being unintentionally turned back. From this brief description it will be seen that the construction of the device is such that adjustments are readily made and the annoyances incident to many of the forms which have been used in the past successfully avoided. The cut shows the mechanism so fully that further description is scarcely necessary.

New Surfacer and Matcher.

Among the number of improved planing machines introduced by the Glen Cove Machine Company, Limited, of Brooklyn, N. Y., whose specialty is planing-mill machinery, is a new double surfacer and matcher, which we illustrate in the accompanying engraving. It is their No. 1½ machine, and is made in two sizes, 14 and 24 inches wide respectively, and each machine will match to its full rated width. The frame is heavy and substantial, all joints are planed and fitted solidly together, and the total weight of the machine is 9500 pounds. All the shafting is of steel and all the gears are cast from iron-cut patterns. It has six feed rolls, which are raised by the new hoisting device patented by this company, and by which the rolls in each pair are kept absolutely parallel at all points, thus securing uniform pressure across the whole surface of the board. The pressure-bars, before and after the cut of the top and bottom heads are all adjustable. The cutter-head boxes are firmly yoked together to prevent any possibility of their getting out of line. Each top and bottom head, with its journal, is forged in one piece from solid cast steel, and is slotted on all four sides. It has their weighted chip-breaker and adjustable pressure-bars above the matcher plates. The expansion gears are made fast to the shafts, which revolve in boxes, by which means they can be oiled at any time while the machine is running. All parts of the machine, large and small, are numbered, so that any piece may be ordered by simply giving its number by wire or letter. All shafts and fittings, including bolts, screws and nuts, are finished to United States standard sizes. The cutter head pulleys are extra large. By means of their newly arranged end opening, the under cutter-head may be completely exposed in a moment. The machine planes from ¼ inch to 8 inches thick, and will do all classes of work, from the smallest to its full capacity, with equal facility. This machine is made also as a simple double surfacer with two pairs of broken rolls, and sectional chip-breaker before the cut of the top head. The side spindles are provided with their improved ring attachment, and a large adjustable oil step, lined with hard copper, to prevent any vibration in the spindles.

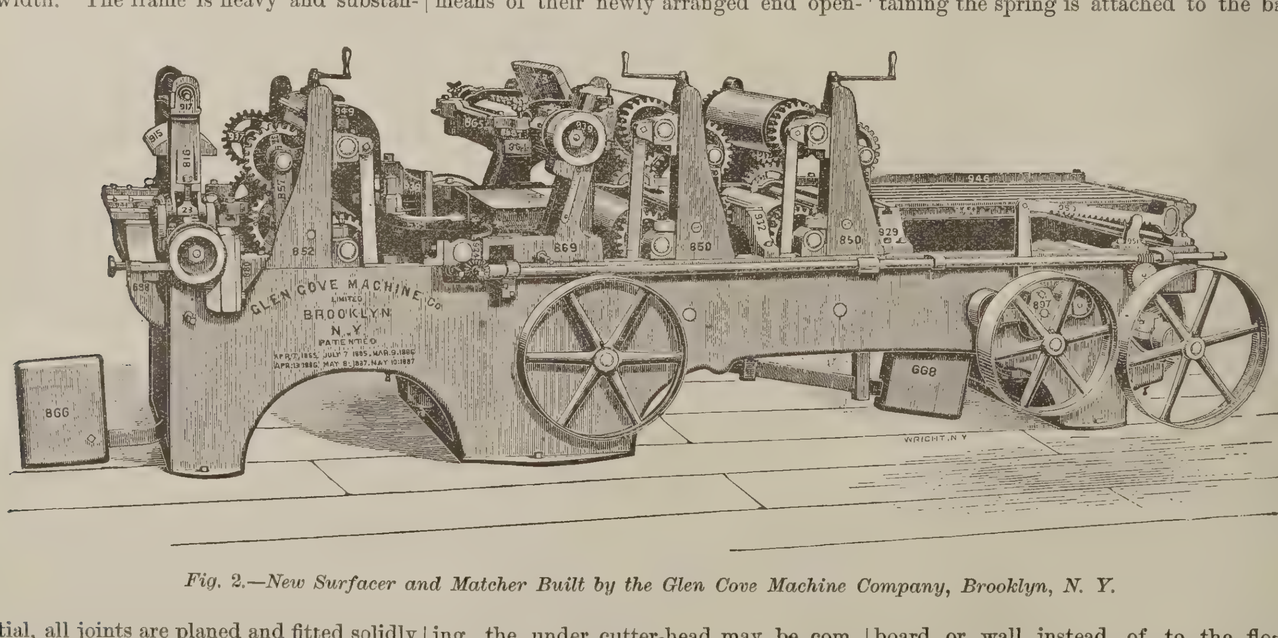


Fig. 2.—New Surfacer and Matcher Built by the Glen Cove Machine Company, Brooklyn, N. Y.

Barlow's Door Stop and Holder.

W. S. Barlow is the inventor and manufacturer of the door stop and holder illustrated below. It will be seen that it consists of two pieces, one attached to the door and the other to the floor. The portion attached to the floor is a casting 3 inches long, with a finely tempered flat steel spring extending the entire length of its top, and firmly riveted near the end inside. The portion attached to the door is so arranged that as the door opens it will strike the spring at the desired point and spring it down and slide into the corrugation, which both prevents the door from going further and holds it in its place. It will be seen that the part attached to the door is fastened by three screws, which are placed in slots, thus giving ample room to regulate the power of the spring, according as it is raised or lowered, so that it will strike the spring at the point that

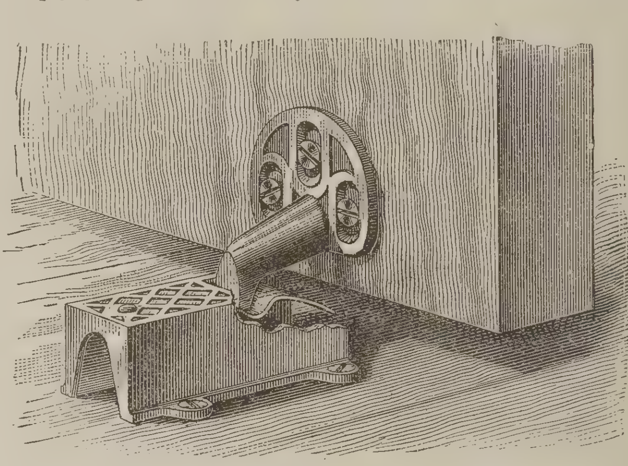
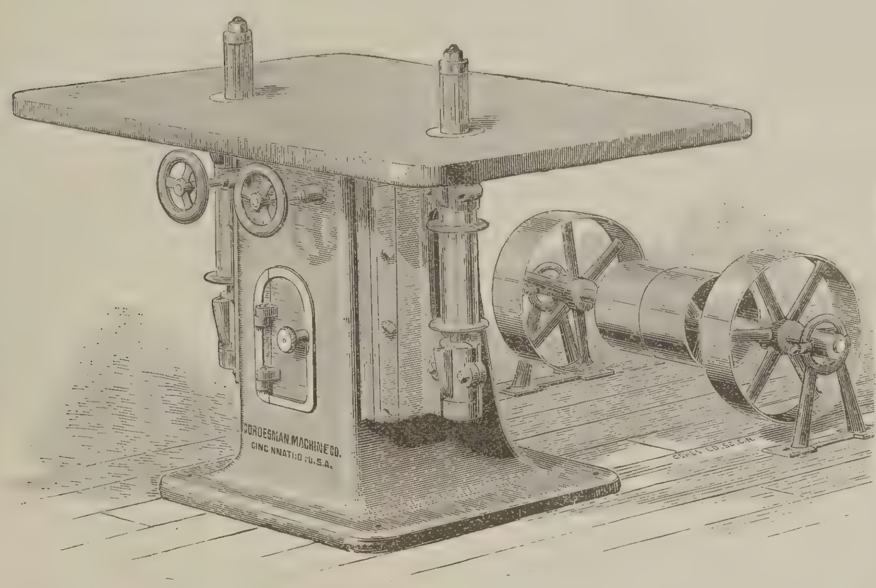


Fig. 3.—Barlow's Door Stop and Holder.

gives the right amount of resistance. Other sizes and styles are made for large doors and car doors. Another pattern is also manufactured, in which the part containing the spring is attached to the base board or wall instead of to the floor. These goods are finished japanned, bronzed or nickel plated. Their simplicity, the fact that they can be adjusted and the low prices at which they are afforded are points of advantage alluded to.

Double-Spindle Shaping Machine.

The Cordesman Machine Company, Butler street, near Pearl, Cincinnati, Ohio, are directing attention to a new vertical double-spindle shaping machine of medium size, a general view of which is presented in Fig. 4 of the engravings. The machine is intended to work straight and irregular forms for furniture, architectural implements, carriages, wagons and other similar work. The machine is described as of modern design, and made by first-class workmen. It is said to have the strength and capacity for every variety of general work, and is claimed to be superior to any machine of its kind now made. The column is made heavy, and the metal of which it is composed is well distributed. It is cored out, and cast in a single piece. The base is very wide, thus giving the machine a substantial floor support. The coring is so arranged as to form a rib on the outside in a way to stiffen the machine and lessen the liability of breakage. The column is fitted with a door, making the space on the inside a convenient receptacle for tools. The spindles are long, stiff, accurately turned and truly ground. They are made of 1½-inch steel, and measure 1 inch in diameter above the table. They are placed 24 inches apart, measured between centers. They revolve in cored-out frames, having connected, self-oiling babbitted boxes with improved composition metal take-up steps for end play. The frame work, by being planed true and gibbed to plane ways on the column, is arranged to keep the spindles in perfect line and from heating. The spindles are adjusted vertically by means of screws on the inside of the column operated by the hand-wheels in front of the machine. The iron table, which measures 40 x 46 inches, is cast in one piece, and is amply large for any kind of work. It is well braced, carefully planed, and fitted with concentric rings to suit the various sizes and kinds of heads and cutters. When desired, concentric rings may be made with a projecting collar above the table to act as a guide. A wooden table is substituted for the iron tadle when desired.



Novelties.—Fig. 4.—Vertical Double Spindle Shaping Machine.

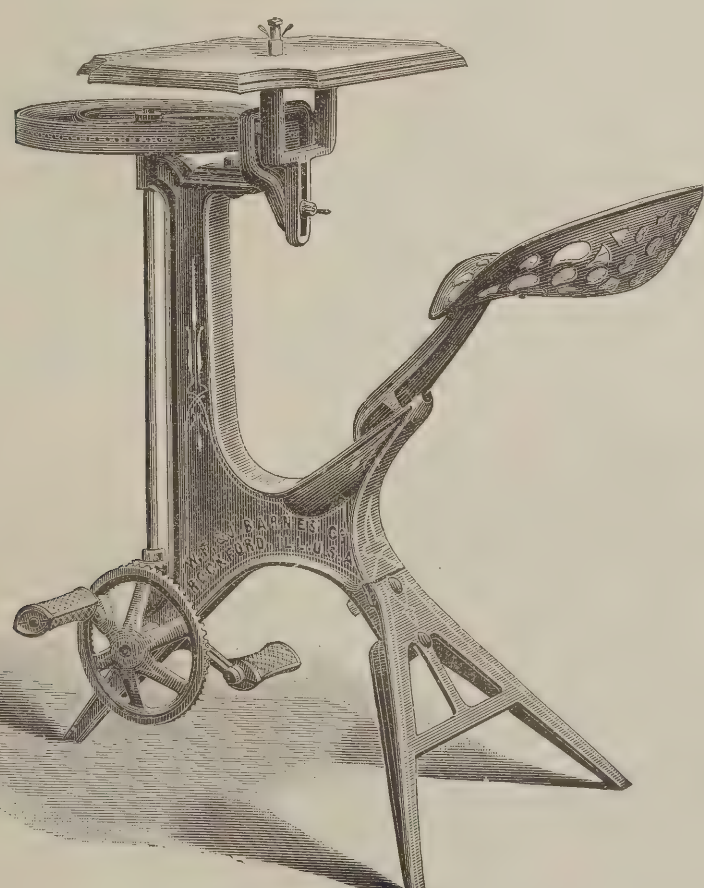


Fig. 5.—Improved Foot-Power Former Built by the W. F. & John Barnes Company, Rockford, Ill.

Foot-Power Former.

The W. F. & John Barnes Company, Rockford, Ill., are directing attention to their improved foot-power former shown in Fig. 5 of the engravings. This machine has proved very valuable to many builders in various lines of work. It is especially adapted for use in preparing house finishing. The present styles in vogue are such that, in many cases; it is difficult to get the work made at a steam factory without unreasonable cost. To finish off various parts of rooms, such as irregular panels, beadings in irregular places, copings and moldings on various sections of cornices, requires work that can better be done on the spot than at a distance after measurements are taken. The makers also direct attention to the value of this machine in finishing drawer fronts; also in finishing door and window sash. They assert that there are thousands of places where the machine can be used in the process of finishing houses in the general way suggested above. The parts of which the machine is composed will be readily understood by reference to the engraving. The operator sits in convenient position and propels the machine by double foot crank, which in turn drives a vertical spindle, at the top of which is a large wheel; this is belted to the spindle on which the cutters are placed. The machine is claimed to be thoroughly practical and easily managed. Special advantages pertain to this machine by the use of the velocipede foot-power peculiar to this company. The device can be reversed in-

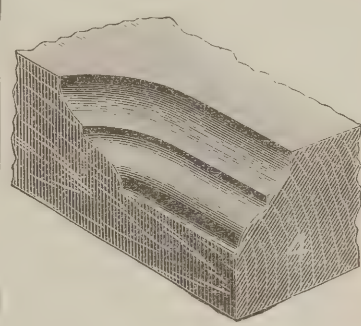


Fig. 6.—Example of Cut Made by Foot-Power Fromer.

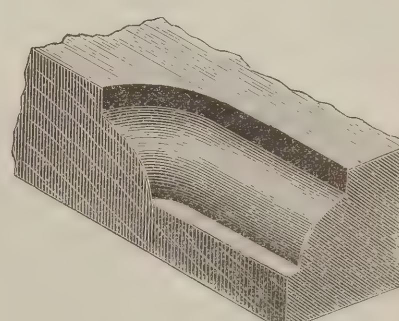
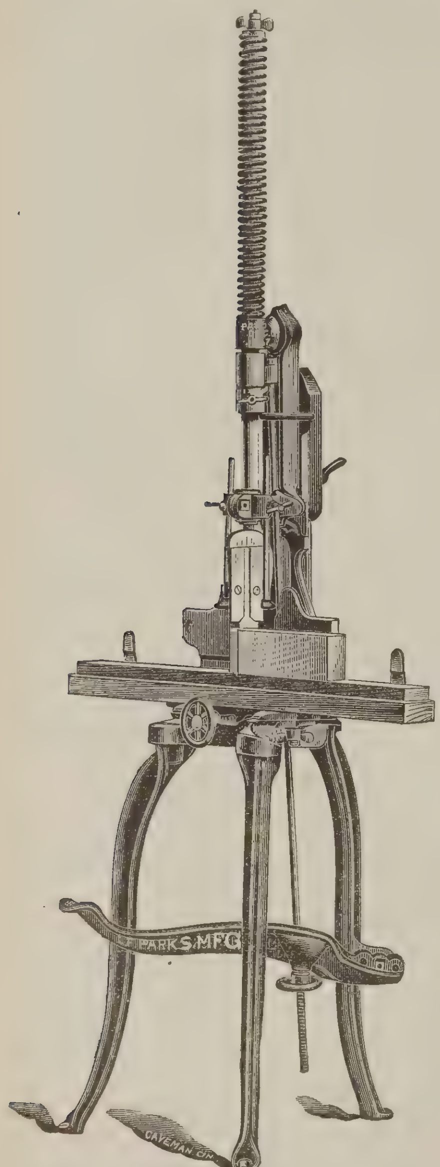


Fig. 7.—Example of Cut Made by Foot-Power Former.

stantly without the aid of shifting belts to reverse the motion. The construction is such as to allow the knife to be run in either direction with equal force and effect. Figs. 6 and 7 show forms of moldings which are readily produced by this device.

Combined Mortiser and Tenoner.

L. F. Parks, 272 Colerain avenue, Cincinnati, Ohio, is putting upon the market



Novelties.—Fig. 8.—Foot-Power Mortising and Tenoning Machine.

a combination machine which is claimed to be the most complete machine ever offered to wood-workers. It is illustrated

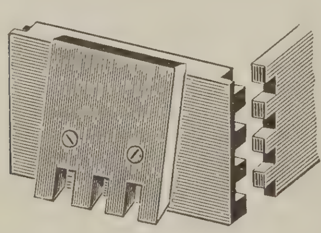


Fig. 9.—Bit for Cornering Drawers, with Sample of Work.

in Fig. 8 of the engravings, while some of the attachments are shown in Figs. 8 to 12 inclusive. The device is intended for mortising, tenoning and mitering, cornering shingles and cutting O G's on the ends of sash rails, also for tongueing and grooving stuff for corners of drawers. It likewise mortises for the end of blind slats, and, in fact, is found satisfactory for doing the general class of work for which it has been designed. It can also be used

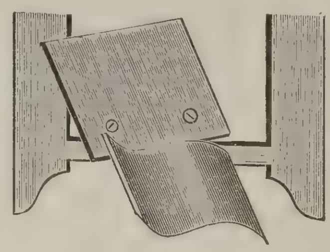


Fig. 10.—O G Bit and Work Produced.

on a work bench by removing the legs and screwing it in place. The bench is considered an advantage in many cases, since it affords facilities to get out stuff and also gives room to work long material when space in the shop is limited. The tools are

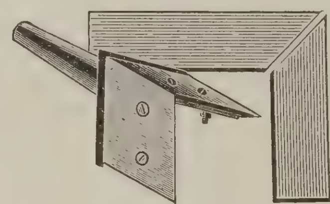


Fig. 11.—Mitering Tool and Sample of Work.

fitted to the machine by a tapering shank and are so arranged as to be quickly changed from one to the other. As a mortising machine, the maker claims it to have some very valuable improvements which enable the operator to produce as perfect work as can be done on any power mortiser. One feature is the way in which the two middle collars are connected around the chisel shaft for setting the chisel square. The shaft is adjustable by turning the reverse handle H in the engraving, and then tightening the thumb-screw T. Another advantage is in the quick and accurate adjustment for different thicknesses. The device is claimed to be a great success as a tenoning machine, for which the adjustments are quickly and conveniently made. We illustrate in this connection an O G bit, useful in this device, the bit lying across some work which has been cut with it. We also show a mitering tool and a bit used for cornering drawers and boxes. The blind slat chisel is likewise shown and also the tenoning tool.

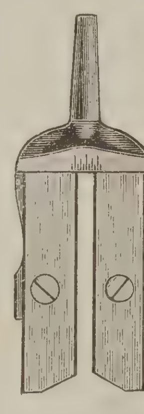


Fig. 12.—Tenoning Tool.

Universal Power Boring and Drilling Machine.

M. C. Henley, of Richmond, Ind., is putting on the market a universal power boring and drilling machine, which we illustrate in Figs. 14 and 15. The machine is designed for boring in woodwork or light drilling in iron, and its arrangement is clearly shown. The belt-wheel A is driven by a belt from the counter-shaft and about three idler pulleys, B C D, the pulley B serving to keep the tension on the belt always the same, no matter in what direction the apparatus is moved. The cap E, which is removable, may be taken off and the feed-screw and nut F put in its place, for which an enlargement at the top of the tool frame G is provided. This enables the operator to use the machine for light drilling in iron, the change being made in a very short time. The frame G is bored out sufficiently to permit of the feed screw moving up and down freely. The shield H is designed to be made fast to the frame G and to cover the gears, providing an absolute safeguard

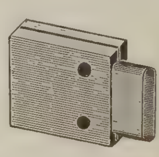


Fig. 13.—Blind Slat Chisel.

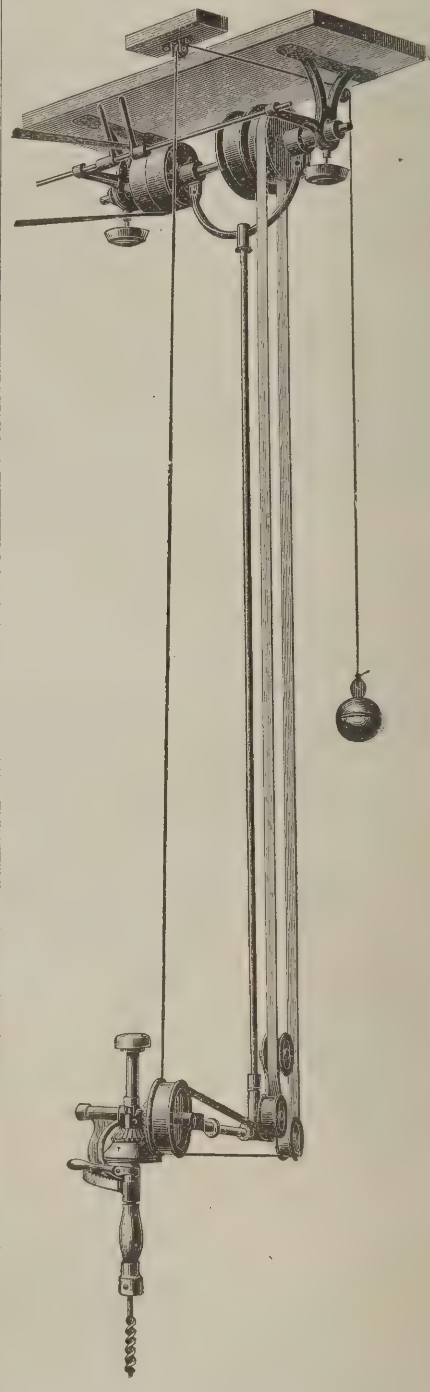
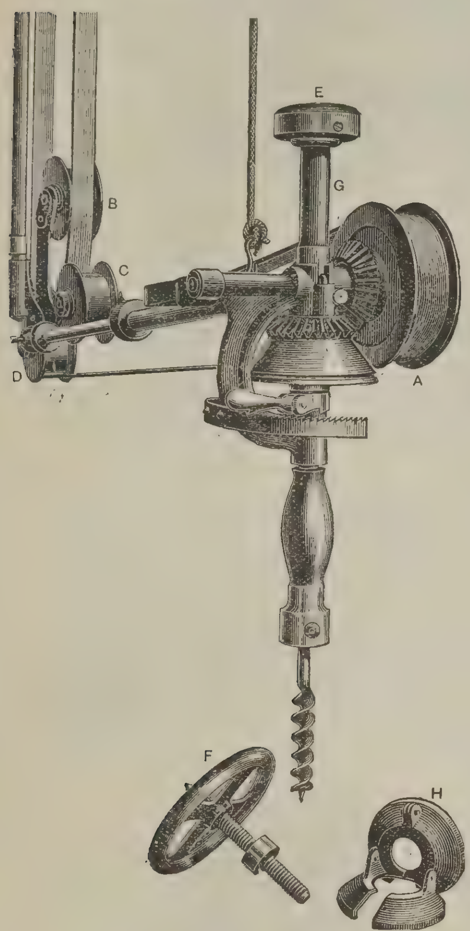


Fig. 14.—Power Boring and Drilling Machine Built by M. C. Henley, Richmond, Ind.

against accident to clothing or fingers. The gears referred to are all cut and run with little noise. The form of the chuck used is what is known as the "Oneida," taking in drills or bits measuring from 0 to $\frac{5}{8}$ of an inch in diameter. The machine is operated by means of two bevel gears, one of which is attached to the tool shaft extending downward in the shape of a cone. Beneath this and attached to the tool shaft is a cone paper-wheel which fits inside of the cone attached to the cog-wheel. This paper-wheel, when the machine is not in operation, drops down and does not come in contact

with the cone attached to cog-wheel until the small ratchet lever is drawn around toward the right, which action forces the paper cone into the iron cone, immediately starting the tool shaft. These two wheels are at all times separated by means of a coil spring located above the tool shaft, and in the tool frame G, except when driving screws, boring or drilling. For this work it is only necessary to press on the cap E, the ratchet lever remaining in one



Novelties.—Fig. 15.—Details of Power Boring and Drilling Machine.

position. The instant this pressure is removed or the lever thrown back the wheels separate and the tool shaft ceases to revolve. The apparatus is perfectly balanced, is as easily handled as a common brace, and

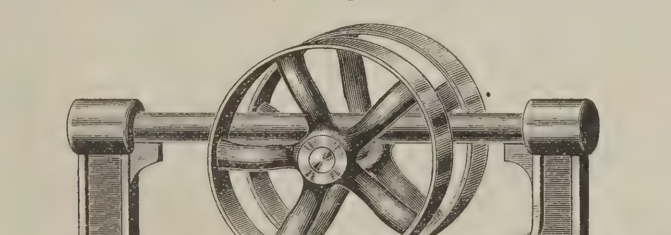


Fig. 16.—The Royal Sliding Door Hanger.

can be used for the most accurate work, running from 500 to 1000 revolutions per minute, according to the work and size of bit used. It can be moved or operated at any angle or direction desired, and is well adapted for a large variety of manufacturing establishments. The machines are at present made in two sizes, Nos. 1 and 2, the former having a capacity for boring a $\frac{5}{8}$-inch hole in hard wood, and the latter a $1\frac{1}{4}$ inch hole.

The Royal Sliding Door Hanger.

The Royal, of which an illustration is herewith given, is a new sliding door hanger recently placed on the market by E. C. Stearns & Co., Syracuse, N. Y. It belongs, it will be observed, to the class of anti-friction or rider-bar hangers. In regard to it the following points are made: The wheels have no flanges which would be liable to cut and wear the wood track, but are made with a broad, flat face; the axles and rider bar are constructed of round steel; the pins whereon the hanger slides, which permit perpendicular adjustment, are of flat steel, allowing a reduction in width of casing to a minimum; and it is secured by screws to the top edge of the door, which dispenses with any cutting or fitting in order to accommodate the adjusting screw.

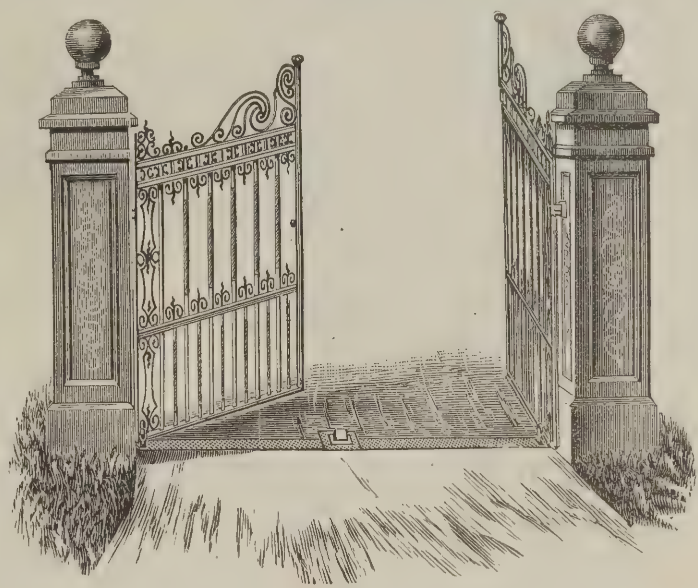


Fig. 17.—The Postlethwaite Gate Stop.

New Gate Stop.

The J. L. Mott Iron Works, No. 90 Beekman street, New York, and Western branch office at 313 Wabash avenue, Chicago, Ill., are putting upon the market what is known as the "Postlethwaite gate stop," an illustration of the application of which is presented in Fig. 17 of the engravings. The idea is to present an unobstructed passageway when gates are open and at the same time have a satisfactory stop for them whenever they are closed. A sill plate is put in position flush with the top of the drive or passageway. Underneath this sill plate is a shaft running longitudinally, carrying upon its middle portion the stop, and at each end a wheel bearing against a portion of the gate near the hinges. As the gate is being closed it presses against the wheel, and in so doing raises the stop in the center ready for the gate to strike. When the gate is open the stop falls by its own weight and lays level with the roadway. The makers direct particular attention to the simplicity of the device, and say that there is practically nothing to get out of order. All of the parts are of metal, a fact which insures durability. The special object is to rid the passage way of a stop which is likely to trip horses and to have it in such shape as to be driven over safely. The article is sent out in compact form, in shape to be readily put in position. It is manufactured in sizes and styles to fit different widths of openings between the gates posts, and also to work with either iron or wood gates. It is also adjusted to fit those which do not meet exactly in the center of the gateway.

Power-Feed Rod Pin and Dowel Machine.

Herbert Baker, No. 100 Erie street, Toledo, Ohio, is directing the attention of the trade to an improved power-feed rod pin and dowel machine, of which a general view is presented in Fig. 18 of the engravings. In describing this device the maker says that, unlike any other of its class on the market, it has vertical feeding arbors, which give it a decided advantage over the other forms of construction for this use. By the introduction of vertical feeding arbors the maker claims to be enabled to accomplish many very desirable results. Among these are an accessible, conveniently operated and exceedingly rapid machine, as well as a symmetrical design entirely free from the old-time top heaviness of devices of this kind. In a list of the more important improvements and advantages possessed by this machine, attention is directed to the following: The vertical feeding arbors exactly center the stock being turned, and are self-acting. They will turn all sticks round, provided the sticks at the outset are as large as the finished size. The cutting heads are of the best brass gun metal, and accordingly will not discolor the wood. They are made with one or two knives, as desired, but are recommended to be of one knife only. The hollow arbor runs in self-oiling boxes, and is of the best cast machinery steel, by means of which it is possible to give a size to the journals, adapting the

machine to very high velocity, without which good work cannot de done rapidly. One arbor is used for all sizes of cutter heads on the same machine. The hollow arbor journal boxes are connected in one casing. The arbor has a side adjustment and is readily removed from the machine when desirable. In changing one size stock to another no adjustment of screws or parts is necessary. An independent cutter head and set of rolls is provided for each size, which, when put in position, are ready for work. The vertical feeding arbors are centralized by a double-link movement and pressure springs are readily adjustable and do not bring wear upon the working parts. Three speeds of feed are provided, and, in addition, a reverse feed. These are put in motion or stopped by the hand shipper rod shown in the cut. According to the circular before us, three sizes of machines are manufactured, adapted to turn from $\frac{1}{4}$ inch in diameter to 2 inches in diameter.

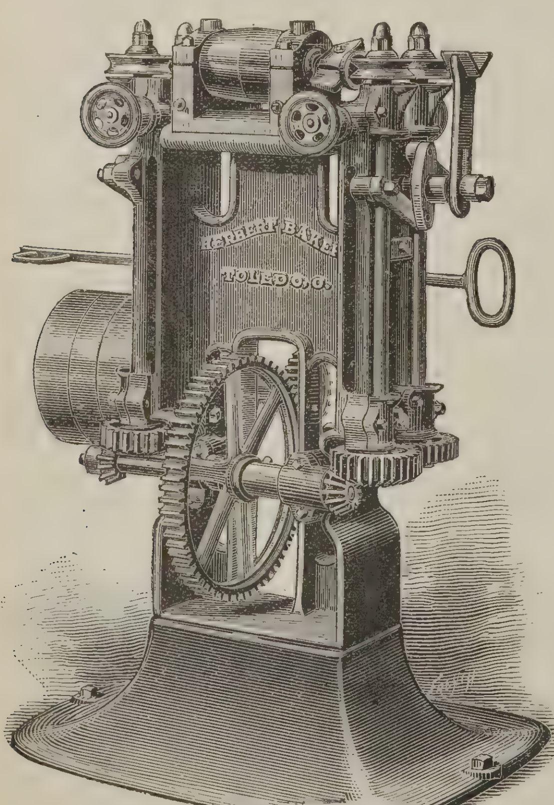
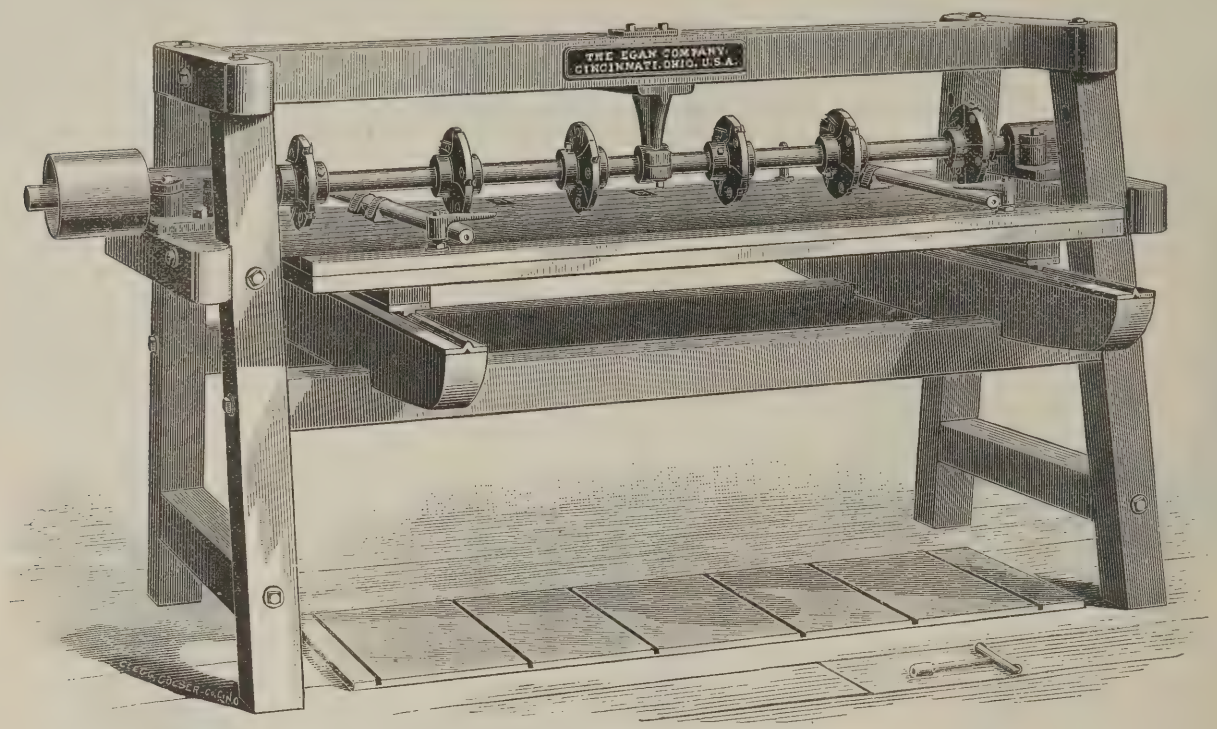


Fig. 18.—Power Feed Rod, Pin and Dowel Machine.



Novelties.—Fig. 19.—Improved Dado Machine, Built by the Egan Company, Cincinnati, Ohio.

Improved Dado Machine.

The Egan Company, 221 to 241 West Front street, Cincinnati, Ohio, are directing attention to a new dado machine, shown in Fig. 19 of the engravings. It is designed for use in furniture works, planing mills and box factories, and wherever it is desired to cut one or two dadoes at one time. We learn from the company's circular that the mandrel is made of steel, is very large in diameter and runs in three self-oiling boxes. The center box is adjustable and is provided to stiffen the shaft and prevent its springing, thus insuring accurate work. The heads are adjustable and are of the expansion variety. They are made to expand to twice their narrowest width without change of bits. Three regular sizes are made, cutting respectively from $\frac{1}{8}$ inch to 1 inch, from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches, and from 1 inch to 2 inches. The bed is below the cutters, and is furnished with grooved slides running on planed ways, and is provided with handles and clamps to hold down the stock. The advantage of having the bed below the heads is that the inequalities of the stock do not affect the accuracy of the cut. The inequality being on the inside of the box or frame causes the uncut portion or outside always to measure alike. The machine is adapted to be belted either from above or below the floor, as is most convenient.

Monitor Frame Pulley.

The Palmer Hardware Mfg. Company, Troy, N. Y., are putting on the market the Monitor Frame Pulley which is represented in the accompanying illustrations, Fig. 20 giving a general view of the pulley and Fig. 21 showing the mortise into which it fits. It will be perceived that in general form this pulley is not materially different from certain styles made of cast iron now in the market. It has holes in the ends of the cases through which to drive the brads to fasten it in the mortise. At the rear edge of the case there is a cord guard which is referred to as making it impossible for the cord to leave the pulley, thus removing a serious objection to a pulley having no face plate, which on account of having to be secured by brads through the ends of the case cannot be taken out for the purpose of readjusting the cord. The frame of the pulley is made of corrugated sheet steel, and the company mention that they

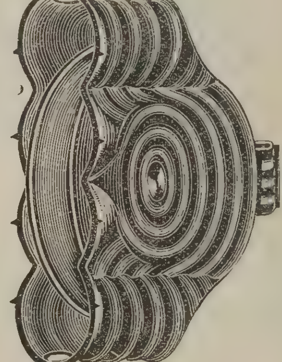


Fig. 20.—Monitor Frame Pulley.

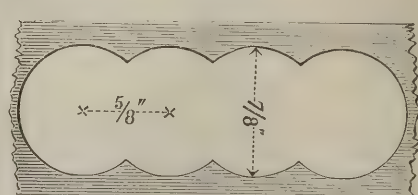
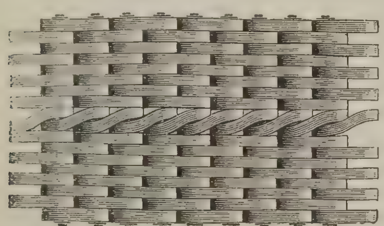


Fig. 21.—Mortise for Monitor Frame Pulley.

are enabled to produce it at prices competitive with those of cast iron, while the pulley is exceptionally smooth in finish and accurate in its parts. The wheel is described as having a heavy steel hub which runs on a steel pin, its strength and durability being especially mentioned. This pulley weighs about one-third as much as ordinary cast-iron pulleys, effecting a considerable saving in transportation charges. It fits a mortise by boring $\frac{7}{8}$ holes $\frac{5}{8}$ inch from centers, which centers are gauged by lightly pressing the points on one edge of the face on the jamb where the mortise is to be bored. Among the other points made in favor of this pulley are these: That every wheel runs true; that being made of steel thoroughly corrugated, combining strength and rigidity with a slight degree of elasticity, it is adapted to the irregularities of hand boring; that, being made of finished material, there are no rough surfaces to chafe the cord, and that each case is of exactly the same size.

Leather Link Belting.

A form of belting which is comparatively new in this country is known as leather link belting. It is being introduced by the American Link Belt Company, for which Charles A. Schieren & Co., 47 Ferry street, New York, are the agents. Although it has been before the public only two years, a number of important improvements have been made in it, and some of these are so radical as to adapt it to be used on any kind of machinery. The belts are made in the following manner: Small pieces of solid, selected leather are dressed with tallow and neat's foot oil, which acts as a lubricator to the joints of the pins. The leather is then put through rollers and made very solid. Next it is cut into small links, this process making a link of remarkable tenacity and strength, and one which will stand more strain than a piece of hard-rolled sole leather. The links are then carefully assorted as to thickness and the belt built up to the required width, presenting the general appearance shown in Fig. 22. A special advantage of this belt is, that it has the tendency to hug the pulley around which it runs in such a way as to make the friction between the surface of the pulley and the belt much greater than is obtained by a belt of ordinary construction. In order to adapt a belt of this kind to the shape in which pulleys are ordinarily turned, an improvement has been recently introduced by which the bolts running through the links, instead of continuing through in single lengths, are made in two sections, thus adapting the belt to bend in the middle so as to bring its entire width in contact with the pulley. This improvement is accomplished by the peculiar form of link through the center of the belt illustrated in Fig. 22. In putting up belts of this kind they are allowed to run loosely, and are never taken up unless they actually slip. An inexperienced person seeing a link belt on a machine would naturally think that the belt was too loose, and needed tightening, but these belts have such a remarkable grip power that, though when running the upper side of the belt is so loose that it almost describes a semicircle, the under side is as tight as possible. Fig. 23 of the engravings shows a half crossed belt of this description, and indicates the sagging already referred to. Without the peculiar center link above mentioned the half crossing here illustrated would be impossible. It is believed by the manufacturers that linked belts will in time find great favor for use with machinery in general. They are more pliable than any flat double belt can possibly be made, and it is claimed that, for belts running at right angles, they are the only ones which are reliable and give perfect satisfaction.



Novelties.—Fig. 22.—Leather Link Belt, with American Patent Joint.

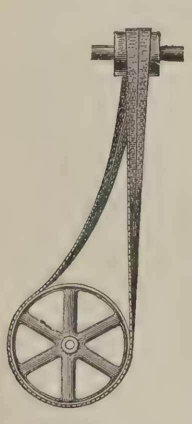


Fig. 23.—Half Crossed Belt.

New Sash Chain.

The Moore & Barnes Mfg. Company, 103 Chambers street, New York, factory at Phœnix, N. Y., are putting on the market the sash chain represented in Fig. 24 of the illustrations. It is described as reinforced by corrugation of the metal at the point where other chains are weak. This corrugation gives, it is claimed, greater tensile strength than any chain made of the same weight, and adds rigidity to the bent portion of the link, so that the tensile strain brought to bear on the chain does not change the form of loop, leaving at all times the metal unimpaired by collapsing. It is pointed out that the reinforcing prevents the link from stretching flat, so that it runs smoothly over any style of pulley.

Fig. 24.—New Sash Chain.

New Spring Hinge.

The Stover Mfg. Company, Freeport, Ill., are manufacturing a line of spring hinges, one of which, their Ideal Lock-Back Spring Hinge, is represented in Fig. 25 of the illustrations. This hinge is described as so constructed that it will close the door readily and hold it closed, while by throwing the door wide open the hinge will lock and hold it in that position, a slight pull only being necessary to unlock it, when the action of the spring will again close the door. The point is made that other hold-back spring hinges are so arranged that when the door is swung open about half way the action of the spring reverses, throwing the door wide open and holding it thus, the door thus being frequently fastened open, especially by children, when not intended. In this hinge, however, the spring has but one action and that is to close the door at all points, except when carried wide open, at which point it is held. It is also mentioned by the company that the hinge is much heavier and stronger than other makes which sell at the same price to the trade, and that the coiled spring is larger and has more coils, rendering it efficient and durable. The simplicity of the spring is also referred to, as it has but three parts and two points of bearing, thus greatly reducing the friction and adding to the life and efficiency of the spring.

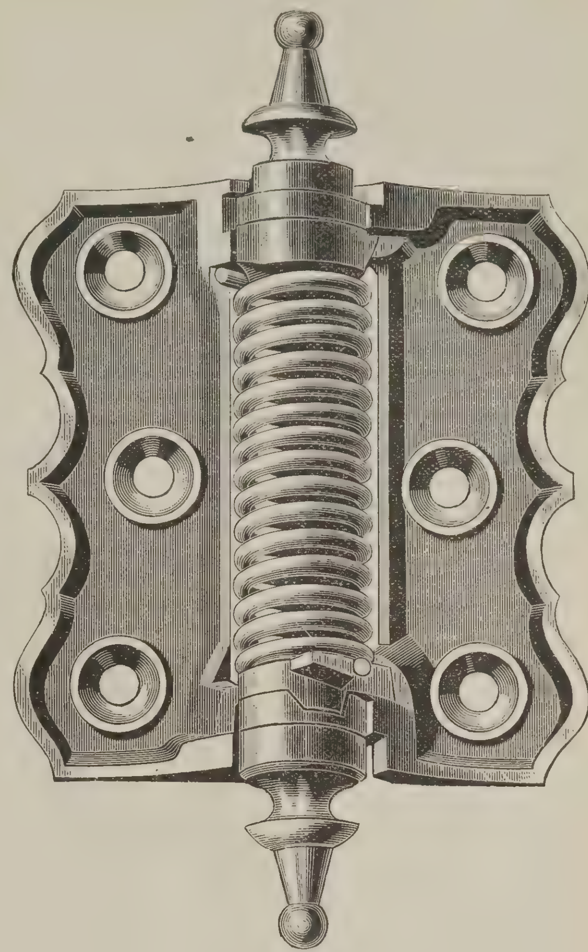


Fig. 25.—Ideal Lock-Back Spring Hinge.

One of the most important features of modern fire-proof construction is the free use of iron lath, which adds greatly to the strength and durability of buildings. In the greater immunity from fires, and, hence, reduced expense for insurance, a marked advantage is gained by its adoption, especially in industrial edifices. The Cincinnati Corrugating Company are in the field this spring with an improved type of corrugated-iron lath, and report extensive orders and contracts all over the country.

The Chesebrough System of Heating by Hot Air.

A novel as well as effective system of heating by hot air has been devised by Mr. R. A. Chesebrough, No. 22 State street, New York, and has been introduced in the heating of what is known as the Chesebrough Building. The system departs from well-recognized forms in hot-air furnace work, and introduces features of construction, so far as the position of the fire and methods of air warming are concerned, that may well command the attention of those who have in charge the heating of large buildings, such as court-houses, school-houses, churches and office buildings. At the same time the system is equally well adapted to the heating of dwellings and other small structures. For the purposes of illustration we have chosen the form of apparatus which Mr. Chesebrough proposes for private houses. From it all essential particulars can be gained, and by it will be understood a description of the system of heating which has been introduced in the building above mentioned, and which it is the special purpose of this article to explain.

Before describing the apparatus, we would remark that what lead Mr. Chesebrough in the direction of the experiments which have resulted in the form of heater here presented was the leaking of gas in the hot-air furnace in his own house, and his objections to the quality of the air thrown into the rooms by it when heated by contact with red-hot surfaces, a condition of affairs frequently met by furnace users. Mr. Chesebrough approached the subject not from the standpoint of the furnace manufacturer, nor yet from that of the theorist, but rather from that of the householder and patient experimenter. Accordingly, with no traditions of the trade to hamper him—in fact, with comparatively slight acquaintance with what others had done—he struck out in lines as nearly new as perhaps anything that can be done in the present state of the art.

The fire in this furnace is outside of the heating chamber. This will be understood by inspection of Fig. 2, which represents a longitudinal section through the single form of apparatus. Ordinary grate bars are employed, being such as have proven themselves of service in steam-boiler furnaces. The products of combustion are carried over a bridge wall, thence downward into a flue which communicates with a dome-shaped iron construction. Here the products of combustion have a chance to expand and naturally give off their heat to the iron dome. From thence their course is again downward, and thence into the flue. In larger forms, and more particularly in the apparatus in the Chesebrough Building, several of these domes are employed in a line, through all of which, in succession, the products of combustion are drawn. Referring to the cross-section shown in Fig. 1 it will be seen that the fresh air is admitted into the chamber surrounding the dome, or domes, as the case may be, by means of a gutter or open channel at the base. In the heater in use in the Chesebrough building the air is driven into thd heating chamber by means of a fan, the speed of the fan or pressure being regulatee by the temperature of the outside air, the space to be heated and other considerations. The fan is not an essential element and would always be omitted in small apparatus, and very generally in large. A leading feature of the system is a large volume of air delivered at a moderate temperature, as opposed to a smaller volume more or less overheated. The rings near the top of the views in Figs. 1 and 2 show the position of the pipes leading to the different rooms to be warmed. These are arranged as in ordinary furnace work. As we have already stated, in the building in which his apparatus has been most thoroughly tested, several domes are in a row. At first, six were employed. After the apparatus had been put up, it was found that the smoke-pipe was still so hot that it would seem probable that additional domes could

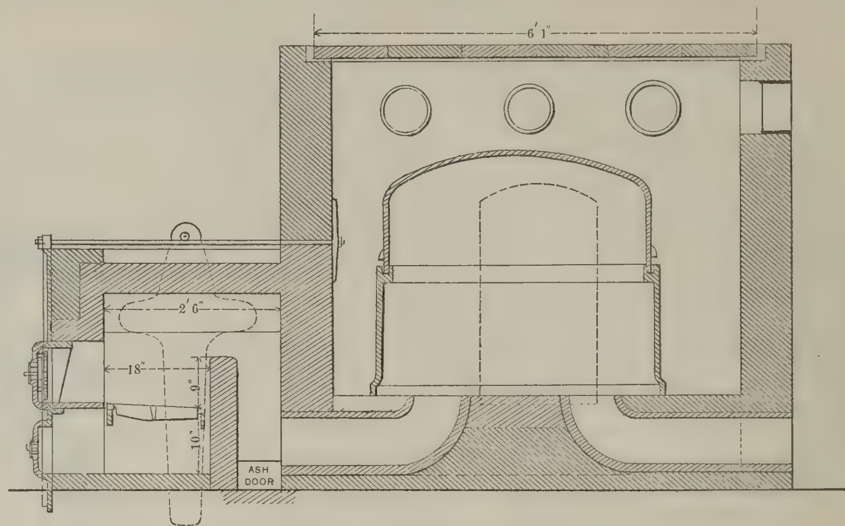
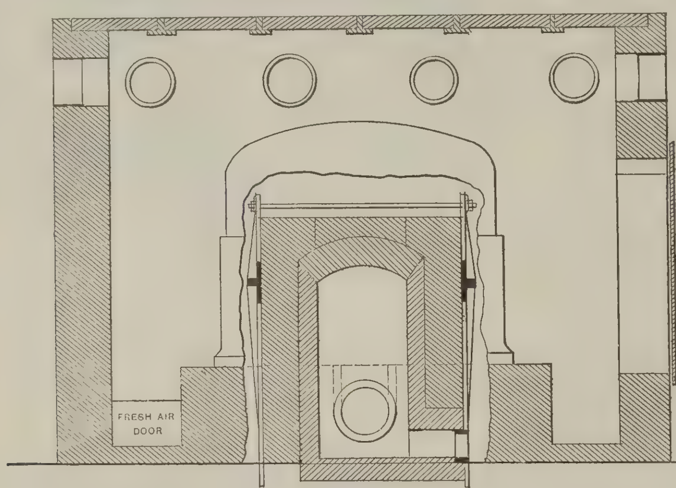


Fig. 2.—Longitudinal Section.



The Chesebrough System of Hot Air Heating.—Fig. 1.—Cross Section Through Furnace and Heating Chamber.

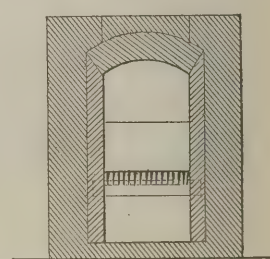


Fig. 3.—Cross Section Through Furnace.

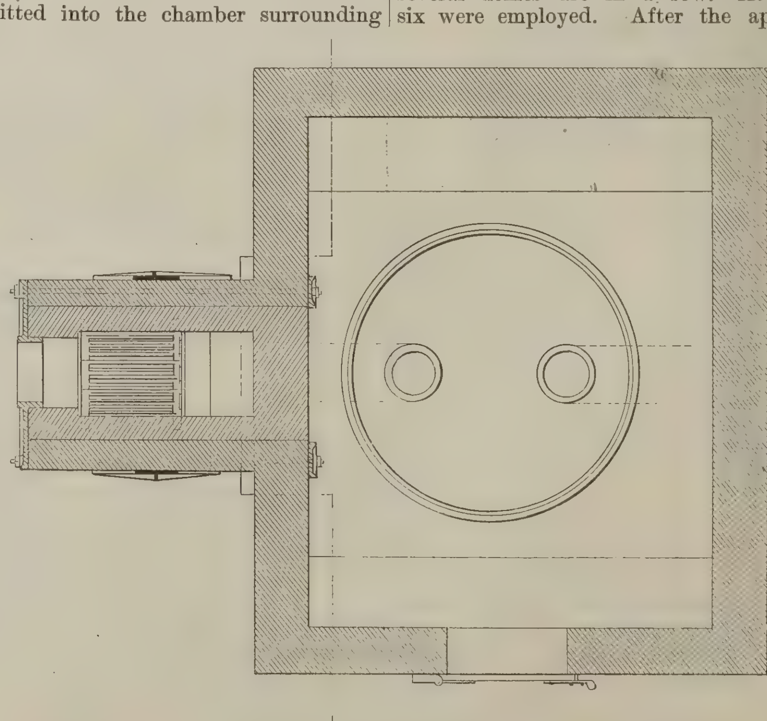


Fig. 4.—Horizontal Section or Plan.

be used to advantage. Accordingly, an extra chamber was constructed in which three more domes were placed and the smoke-pipe was removed to the back of these. The result was that these also were thoroughly heated, still further increasing the heating capacity of the apparatus. There are now in use nine domes of the kind shown in Fig. 2, all in a row and all drawing from the one fire. The grate surface is small and the fire is never driven to extremes. The volume of air that is being supplied to this hot-air chamber we did not ascertain definitely, nor yet did we learn the amount of up-take. Suffice it to say, however, that these nine domes with the air about them fail to extract all the heat, and that the pipe leading to the chimney is still too hot to bear the hand. Mr. Chesebrough's idea is that this form of construction can be extended until very nearly the theoretical value of heat will be secured. He thinks much less than one-fifth of the heat produced by the fuel burned is secured for use by the ordinary form of furnace.

With reference to the amount of fuel that is consumed in the apparatus we examined, we learned that less than ½ ton per day is being employed upon the grate bars, and a more comfortably heated building we have not been in in a long while. It is a large office building, five stories in hight, with the usual subdivisions. In the coldest blizzards of the present winter, when steam heat and other forms of warming have utterly failed in many buildings, this structure throughout has been in comfortable condition. As already remarked, the plan is to employ large volumes of moderately warmed air. There is a striking application of this principle to which attention should be directed. An interior court in the building is provided with three registers in the floor. Through these warm air is supplied which so comfortably heats the court and the corridors leading from it that the inside offices, as they are called, are warmed from this course alone. From these offices, windows open into the court, and instead of being provided with a separate register, it is only necessary to open the windows, thus taking the warm air from the court as it would be taken from outdoors in summer time. The result is entirely satisfactory.

Some very strong claims are made for this apparatus, and from the inspection that we have given it we have no hesitation in saying that they are well founded. Among the advantages to be noticed is the separation of the fire and the resulting gases, from the air that is to be carried into the rooms. Instead of the apparatus being made of many pieces with many joints to leak, it is simple in its parts and with joints that are not likely to leak under any circumstances. A heavy cast-iron dome forms the radiating surface, and the air circulates freely between it and the walls of the inclosing chamber. The combination is such as to insure the ready taking up of the units of heat by the current of air passing through. Other advantages are the economy of fuel, and a plan of construction which adapts the furnace to the heating of the largest sized buildings. Referring to the engravings, Fig. 1, represents a cross section through the apparatus, showing the relationship of the furnace with the heating chamber. Fig. 2 shows a longitudinal section indicating the position of the grate bars and the course of the currents up into the dome and thence out into the chimney, or in the case of larger apparatus, into succeeding domes. Fig. 3 is a cross section through the furnace proper, showing the grate bars, and Fig. 4 a horizontal section or plan. Where a succession of domes are employed, the back wall, as indicated in Figs. 2 and 4, is omitted, and the domes placed in regular order in the one chamber.

NEW PUBLICATIONS.

MARBLE AND MARBLE WORKERS. A handbook for architects, artisans and students. By Arthur Lee. 140 pages. Bound in cloth. Price 80 cents

The author of this little work in the course of his business has visited the principal European quarries, and has become practically familiar with the various methods adopted for raising and working marble. Some time since he contributed a number of papers on the general subject suggested to the London *Building News*. In the interval these articles have been revised and added to, and the result is presented in the volume before us. A history of marble and marble workers is included. The British marbles are discussed, as are also Belgian, French, Spanish and Portuguese marbles, as well as those of other European countries. One chapter is devoted to American marbles, and evidently considerable care has been taken to learn the facts with reference to marble in this country. Notwithstanding, a number of inaccuracies are to be noticed, and some information has been omitted which would have gone to make this part of the book much more satisfactory. One of the most valuable portions of the book is a list in which is presented a comparison of the best known marbles. The last chapter of the book is devoted to suggestions of the use that may be made of the information contained in the volume.

HOMES OF TO-DAY.

A pamphlet of nearly 100 pages, entitled "Homes of To-day," has been issued by Frank L. Smith, architect, No. 22 School street, Boston, Mass. The frontispiece is a colored plate representing one of the house designs presented in another part of the work. The illustrations throughout are perspectives, elevations and floor plans, showing houses at varying costs, and naming the price at which plans and specifications, complete for erection, will be furnished. The opening chapter is the Drainage of a House, prepared for this work by William Paul Gerhard, the well-known consulting engineer of this city. The work throughout is on a higher plane than many of the catalogues of ready-made house plans which have come to us, and is no doubt of interest to a large class in every community. The designs present a degree of sameness in treatment, however, that is not as pleasing as though variety were introduced by the employment of different architects or artists in the preparation of the engravings. The printing and general style of the work are excellent.

MONCKTON'S STAIR BUILDING AND ONE PLANE METHOD OF HAND RAILING. By James H. Monckton. Large Quarto. 78 full page plates, with accompanying text and 7 wood-cuts. Bound in cloth, with gilt side title. Published by John Wiley & Sons. Price, $6.

In the issue of this journal for February we presented engravings from one of the plates in this new work on stair building, by Mr. Monckton. Accordingly, our readers are measurably familiar with what is contained in the volume, so far as relates to principles and the scope of the work. The book in some respects is the most comprehensive of anything that has ever been presented. If any criticism were made upon it, it would be with reference to the meagerness of the text. The engravings have been very carefully prepared; but in some instances the amount of explanatory text has been reduced to a brevity that is discouraging to those who are not able to read a drawing without the assistance of explanations. At the outset stairs are discussed broadly. Reference is made to stairs in use in the past, and illustrative diagrams are presented. Definitions are then introduced, thus giving the reader the benefit of the author's vocabulary. A list of books relating to stair building, with dates, is given, and then suggestions to teachers engaged in giving instructions in architectural drawing in technical schools are presented. The author's idea throughout has evidently been to use the work as a text book, and for this purpose the text and plates are printed only on one side of the page, making one-half of the pages of the book blank. This facilitates tearing the work up and having it loose in card form, where such shape is desirable. The plates occur on right-hand pages, and the text on left-hand pages. Stairs of various kinds and sizes are illustrated and described, and afterward the subject of hand railing is introduced, which is very carefully elaborated, and then follows the application of the one plane method which it is the special object of this work to elucidate. The book is handsomely bound and has been very carefully printed. Various designs of stairs are shown near the close of the book, including illustrations of hand railings, balusters, with sections of framing, carvings, &c.

WOOD CARVING FOR AMATEURS, containing descriptions of all the requisite tools and full instructions for their use in producing different varieties of carvings. Illustrated. Pamphlet, 44 pages. Price, 50 cents.

Carving in wood is an art in which various advantages are combined and is one which is not only excellent in itself, but is frequently a stepping-stone to matters of still greater importance. Wood carving is specially suited to those whose necessary occupations and employments allow them very little leasure to devote to amusements and accomplishments. It is an employment which can be taken up at any time and which can be easily relinquished. It is also a means of livelihood to a great many persons, and is an important adjunct to various trades. The little book before us is intended, primarily, to give information on the subject for amateurs. It is of such a character, however, as to be useful to those who have a desire to acquire a knowledge of wood carving for its advantages as an employment. The subject is carefully discussed, tools are illustrated, directions are presented and in general the reader is carefully instructed in the art.

Saltpetering, a difficulty encountered with a great deal of brickwork, is, by C. H. Smith, charged to electrical influences. Various circumstances, he says, seem to infer the probabilty that voltaic electricity, considered as a chemical agent, may act some part in conveying moisture from the atmosphere to the walls of a building. All substances naturally possess electrical energies which are inherent in them; probably there may not be two substances, or even two distinct surfaces of the same substance, that are not in different electrical relations to each other, and it is a law of electricity that bodies in opposite states attract each other. Lime, sand, bricks and hair, materials with which walls are usually constructed and plastered, are all, when dry, bad conductors, whereas water is a good conductor of electricity; and whenever the atmosphere of water, or any part of the surface of a body, gains accumulated electricity of a different kind from the contiguous substances there is an immediate tendency to bring the parts in contact. In this manner, other circumstances being favorable, floating aqueous vapors may perhaps be imparted to a wall, and absorbed into it by capillary attraction. Electric influence as connected with the preceding inquiry is merely offered as a hint, with the view of inducing scientific men to investigate the subject. Hitherto the public are not in possession of any facts which have immediate reference to this important object.

TRADE NOTES.

WE ARE INDEBTED to Prof. Thurston, of Sibley College, Cornell University, Ithaca, N. Y., for a copy of the Cornell University Register for the current year. It is a book of upward of 200 pages, replete with information that is of interest to all who are considering the question of a university education.

JOHN Q. MAYNARD, 12 Cortlandt street, New York, announces to the trade that he has recently increased his facilities for the manufacture of elevators and dumb waiters, and that he is now making more styles of these articles than ever before, and that they exceed the assortment produced by any other concern. His new illustrated catalogue shows numerous styles, suited for all localities, and having a capacity of from 15 to 500 pounds, and with almost as wide a range in price. The trade is invited to send for copies of this catalogue.

THE CALENDAR issued by our contemporary, the *Carpenter*, being the official organ of the Brotherhood of Carpenters and Joiners of America, and published by P. J. McGuire, general secretary, Philadelphia, contains a table showing the progress of the Brotherhood. The organization was instituted in 1881. At that time 12 local unions were in existence, with 3788 enrolled members and 2042 beneficial members. Up to 1885 comparatively slow progress was made, the number of local unions at that date being only 80, and the membership less than 10,000. In the following year the number of unions was more than doubled and the membership more than trebled. On January 1, 1888, the number of local unions is given as 353, beneficial members as 26,738 and enrolled members as 44,721. The total benefits paid since the date of organization amount to over $40,000.

GEORGE W. OLIVER, of Chattanooga, Tenn., a short time since patented an adjustable pitch board for stair builders' use for laying off risers and treads and for similar work. The object of the improvement is to provide an instrument for the purpose mentioned easy of adjustment, and to be adapted to stairs of different pitches. As shown in the drawings, the tool is made of metal, and is so arranged that each of the three sides of the triangle can be increased in length. A portion of the edge of each side is graduated so as to permit adjustment without the necessity of laying on a rule.

THE EGAN COMPANY, of Cincinnati, Ohio, have recently designed, for a place in the factory of the Robert Mitchell Furniture Company, of Cincinnati, a wood-working machine, whose capacity for deep and wide cutting is a marvel, and the wonder of many mechanics and workers in wood who have seen it in operation. From a description before us, we learn that it will take a plank of solid wood 4 x 14 inches, say ash, oak, maple or any other hard wood, and reduce it in one cut to a single molding, cutting a depth of 3 inches with the main head, and 2½ inches with the lower and each side head. Work of this kind has been considered an impossibility by some workers in wood; but the problem seems to have been solved by the company above-mentioned. We have examined with much interest profiles of work produced by the machine.

TOWER & LYON, No. 95 Chambers street, New York, present in this issue Chaplin's patent iron and wood bottom planes, and Wood's patent extension plumb and level. Price lists are presented in each case, thus giving the reader much desirable information.

THE WELL-KNOWN FIRM of Knisely & Miller, of Chicago, changed their style a short time since, and will be for the future known as Knisely & Miller Brothers. Mr. Robert B. Miller, who has long been associated with his brother, James A. Miller, in the active management of the affairs of the concern, has been admitted to partnership; hence the change in name.

WE HAVE RECEIVED a copy of the Fourth Annual Report of the Chief State Inspector of Workshops and Factories for the State of Ohio. It is sent us by Henry Dorn, who holds the office in question, and is what has been prepared for the consideration of the General Assembly of the State. It contains an immense amount of information with reference to hours of labor, the labor required of minors and the condition in which workshops are found to be, with reference to fire escapes, sanitary condition, &c.

A VERY NEAT PAMPHLET, bearing date February 1, has been issued by F. A. Requarth & Co., of Dayton, Ohio, relating to pilasters, newel posts, hand railings and stair-makers' fittings generally. A number of designs are presented and prices are given. In the preface the statement is made that the company are operating with increased facilities, and are better able to supply orders than ever before. An important element of the equipment of this establishment is the machinery which produces what is described in the catalogue as "prismatic" work. If we mistake not, this concern was the pioneer in introducing square, hexagonal and octagonal turned work.

AT THE ELECTRIC LIGHT CONVENTION held at Pittsburgh the latter part of February, being the fourth annual convention of the National Electric Light Association, Mr. Charles A. Schieren, of 47 Ferry street, New York, presented a paper entitled "Leather Belting: Its Origin and Progress in this Country." This paper has since been published in pamphlet form and is now being distributed by the firm of which Mr. Schieren is a member. In it there is described a process of manufacturing various kinds of belting, with special reference to the leather link belting of which Charles A. Schieren & Co. make a specialty. The pamphlet is one that is of interest to all users of belts, irrespective of the kinds of machinery upon which they are employed. Copies, we understand, are being sent gratuitously to all applicants.

THE RICHARDSON & MORGAN COMPANY, 76 Beekman street, New York, is the style of the concern which succeeds the Raymond Furnace and Mfg. Company. Under date of March 19, they issued a circular calling attention to the change in the corporate name, and stating that in addition to former goods they are prepared to supply full and complete lines of Richardson's furnaces, fireplaces, heaters and ranges. They also announce that they are sole and exclusive manufacturers of Page's All Right steam and hot-water heaters and the combination steam and hot water boilers. The company will move to new quarters May 1, and after that date their address will be 92 Beekman street, New York.

THE WARREN CHEMICAL & MFG. COMPANY, 114 John street, New York, announce to the trade that they have supplied over 20,000,000 square feet of natural asphalt roofing within ten years past. The chief advantage claimed for this roofing is its durability under varying climatic conditions, and the trade are invited to send for circular No. 23.

A NEW CATALOGUE issued by the Hollenbeck Lock and Knob Company, of Syracuse, N. Y., is a pamphlet of 32 pages, with numerous illustrations of knobs of different kinds and styles, escutcheon plates and other goods, including mortise locks, sash trimmings, &c. Several new articles are described, and the book throughout is replete with interest for builders and architects.

THE MECHANICS' AND TRADESMEN'S ASSOCIATION, which maintains a free library and free reading-room at Mechanics' Hall, Sixteenth street, New York City, has done its usual good work the past season. For girls free classes in stenography and type writing have been maintained, and for boys free drawing classes, including classes in architecture, machinery, free-hand drawing, modeling, &c. Two hundred and fifty boys have attended the school and about 50 girls. The free lecture course of the institute included six lectures on Thursday evenings by speakers of eminence. The past season was the fifty-second for the institution so far as lectures are concerned.

REFRIGERATOR DOOR FASTENERS, together with a line of hinges and other trimmings for structures of this kind, are very generally in demand by carpenters and builders who have occasion to engage in work of this sort. All such will be interested in the price list which P. J. Conroy & Co., Sixteenth and Catharine streets, Philadelphia, have recently issued.

WE HAVE RECEIVED from the Philadelphia Manual Training School, located at the corner of Seventeenth and Woods streets, Philadelphia, a copy of the second annual catalogue. The pamphlet contains a carefully prepared description of the courses pursued in the institution in question, with several pages of engravings, illustrating the course in carpentry, tinsmithing, forging, &c.

B. P. BOWER & CO., 41 Academy street, Cleveland, Ohio, have prepared a very interesting pamphlet descriptive of the specialties which they manufacture. The goods referred to include the Bower sewer gas trap, with variations in construction adapting it to different places, and also combination styles of fittings which save the necessity of plumber's joints under wash-basins, &c. The pamphlet is of special interest to the trade.

FOLDING HANDLES to draw knives facilitate the ready packing away of this useful tool in a chest without danger of damage to the blade. An article or this sort is being put upon the market by A. J. Wilkinson & Co., of Boston, Mass. It is also illustrated and priced in another part of this paper, and accompanying the announcement is mention of a 100-page catalogue of woodworker's tools sent free.

THE CAMBRIDGE IRON ROOFING COMPANY, of Cambridge, Ohio, are directing the attention of the trade to the specialties in iron roofing and siding which they manufacture. They invite the trade to send for copies of their publications.

A NEW CATALOGUE and price list has been issued by L. S. Starrett, Athol, Mass. It contains descriptions of new tools and many specialties which are already known to the trade. A revised price list accompanies the same. This is something many of our readers will be interested in sending for.

MERCHANT & CO., of Philadelphia, Pa., with branch houses in New York and Chicago, head their advertisement, in another part of this issue, with the suggestive legend, "There is no Roof Equal to a Good Tin Roof," and then follow with the advice that builders should see to it that tinners use only the best of materials on their buildings. A tin roof, they say, should last 40 years at least without expense for repairs. They say, where roofs do not last five years before repairs are necessary, that in nine cases out of ten the fault is in the tin. The conclusion reached is to consider the merits of Gilbertson's Old Method and Camaret the two leading brands supplied by this firm. Attention is then called to the following particulars: Every box is stamped with the actual net weight of the plates contained in it, and each sheet is stamped with the brand and thickness. The difference between the two brands referred to is merely that of coating.

DUNCAN C. WHITE, of Pittsburgh, sends us a circular announcing his removal from the premises formerly occupied to No. 71 Diamond street, two doors above Smithfield street. The circular concludes with the statement that estimates are furnished promptly with care and exactness.

THE HANIKA IRON FENCE COMPANY, Springfield, Ohio, ask the trade to send for their illustrated catalogue of wrought-iron fencing, crestings, finials, weather vanes, stable fittings and other similar goods. This concern is already favorably known to many of our readers.

SLIDING BLINDS are rapidly superseding the use of blinds of the folding pattern. Prominent among makers of goods of this kind is William Willer, of Milwaukee, Wis., one of whose engravings is presented in another part of this issue. The trade are invited to send for a special catalogue which is described in the card referred to.

THE NATIONAL SHEET METAL ROOFING COMPANY, Nos. 510 to 520 East Twentieth street, New York, present in another part of this issue the name and address of J. J. Walters, Denver, Col., as the wholesale agent for their goods at the point named. We understand the company considers the prospect for the season's business most excellent at the present time.

J. M. MARSTON & CO., No. 5 Appleton street, Boston, Mass., present in another part of this issue cuts of two of the special foot-power machines which they manufacture. One of these is a circular saw and the other a band saw. Price lists are offered to the trade on application.

BULLARD & GORMLEY, 106 Lake street, Chicago, Ill., direct attention to their Endless, Anti-Friction Door-Hanger; also the Standard Door-Hanger, two new constructions in which the anti-friction principle is employed to good advantage. They request the trade to send for circulars and other particulars.

REDDING, BAIRD & CO., Boston, Mass., announce a removal from Nos. 146 and 148 Franklin street to 83 Franklin street, corner of Arch. The firm make a specialty of stained and cut-glass work for churches and other purposes.

D. R. MILLER, architect, Harrisburg, Pa., informs the readers of *Carpentry and Building* that he has prepared plans of barn buildings of different sizes and styles, the blue prints of which, including specifications and bills of material, he is prepared to supply builders.

WILLIAM R. PITT, 92 Chambers street, New York, has issued a little pamphlet describing the folding gates and guards which he is manufacturing. There are included the Pitt patent folding gates and window-guards, the Bostwick patent folding gates and window-guards, and patent safety folding gates and window-guards. The illustrations have been carefully prepared, and are of a character to be interesting to architects and builders. A list of the specialties which Mr. Pitt is prepared to supply is presented on the last page of the pamphlet.

ACCORDING to Professor E. Dietrich, of Berlin, there are only 57 bridges of brick or stone existing having a span greater than 131 feet. Forty of these have spans lying between 131 feet and 164 feet, 10 have spans of from 164 feet and 200 feet, three of from 200 feet to 230 feet, and one only, the Cabin John Bridge, near Washington, exceeds this limit, and has a span of 237 feet. Thirty of these are road and 22 are railway bridges; one carries a canal, another a conduit, and three are not classified. Fourteen of them date from before the commencement of the present century, 22 were built between the years 1800 and 1860, five between 1860 and 1870, six between 1870 and 1880, and since then 10 have been erected. In 22 of the bridges the rise lies between one-half and one-third of the span, in 18 between one-third and one-fourth the span, in 10 between one-fourth and one-fifth the span, and in six between one-fifth and one-eighth the span. One bridge only, a road bridge in Turin, has a flatter arch than given by the smallest of the above ratios, and in this case the rise is $\frac{1}{8.18}$ the span. The radius at the crown lies in fifteen cases between 66 feet and 98 feet; in eight, between 98 feet and 131 feet; in eleven, between 131 feet and 164 feet, and in three cases, between 164 feet and 187 feet 8½ inches, the latter being the radius at the crown of the Devil's Bridge, at Bevizzo, Italy.

CARPENTRY AND BUILDING

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NOTES AND COMMENTS.

WE devote considerable space in this number to a valuable article on the art of estimating by C. Powell Karr, an architect and engineer who has given very careful attention to subjects of this general class. Mr. Karr offers some reasons for the variations frequently noticed in contractors' estimates that must command the attention of our readers. He presents one or two thoughts which we venture to say have seldom crossed the minds of some of the contractors among our readers. Among these may be mentioned the fact that our country is very large, and that both architects and builders are required for this reason to do work under widely varying conditions. Mr. Karr is of the opinion that a man by devoting himself to the work as a specialty might become an expert in figures for the country over, and thereby be competent to estimate on work of any kind wherever situated. He is certain, however, that nothing short of great skill and absolute devotion to such a scheme would make a man entirely competent. In this conclusion we think many of our readers will agree with him. The allusion to English and French practice, with references to prices used in estimates, is of interest.

THERE are very few frame buildings at the present time, at least, which do not employ building paper in one form or another. It is also in use in buildings constructed of other material, in floors, under roofs and in various other places. Our readers have also had their attention called to various modifications of the paper idea, for example, straw lumber. The use of paper fabric for building purposes—by the term paper being meant broadly a flexible sheet made of vegetable or other fiber, which has been reduced to a pulp and then pressed out and spread and dried—is now advocated by some builders on the following grounds: First, continuity of surface—that is, it can be made in rolls of almost any width and length, is flexible, or, by gluing several layers together, may be made stiff, and will stop the passages of air because there are no joints; second, it has no grain like wood, and will not split; third, it is not affected by change of temperature, and thus has an advantage over sheet metal as roofing material; fourth, whereas in its natural condition it is affected by moisture, it may be rendered waterproof by saturating with asphalt, or by a variety of other methods; fifth, it is non-resonant and well fitted to prevent the passage of sound; sixth, it is a non-conductor of heat and can also be made of incombustible material, like asbestos, or rendered fire-resisting by chemical treatment. The combination of paper with other substances and solidifying the mass by pressure renders practicable the production of a material capable of replacing wood for many purposes; and not least among its characteristics of adaptability is the ease with which it may be made into sheets of any width and thickness, that will not warp or shrink from heat, cold or dampness.

IN another part of this issue will be found an account of the moving of the big hotel at Brighton Beach, Coney Island. This work was accomplished by means of railway tracks extended under the building and supported by piles driven into the ground. Flat cars were then run under, and the building allowed to rest upon them. Locomotives furnished the motive force through the means of rope, block and tackle, &c. Archimedes, the Greek philosopher, who discerned and first applied the principle of mechanical power, said that with an outside fulcrum and a lever sufficiently long he could lift the world. The engineer in charge of the Coney Island hotel experienced almost as much ridicule with reference to the plan that he proposed to employ as Archimedes experienced from his slower-witted contemporaries. If the old philosopher could have witnessed the triumph of his genius, when at a signal the six locomotives strained at and finally persuaded the huge hotel to retreat from the hostile waves of the sea, he would, perhaps, have been willing to die happy a second time. As it was the crowd of spectators cheered from sheer exhilaration at the visible display of so much power. The most important result following from this experiment is that a new plan of moving large buildings has been discovered and put into successful practice.

THE city of Detroit, Mich., derives its water supply from Lake St. Clair, 7 miles above the city. The pipe extends out into the lake quite a distance and draws water from a point that is believed to be free from sewage and other contamination. The strainers through which the water is supplied are 25 feet below the surface, which is certainly below the frost line, as things are ordinarily considered, and yet some peculiar phenomena are encountered in winter time. Every now and then, during the cold weather of the past season, these strainers have been more or less filled up by ice needles forming in them. For a short time one day, during the latter part of March, the city experienced a water famine that puzzled, bewildered and exasperated householders in general. Ice over a foot thick, it appears, had formed on the strainers, which prevented the water from passing through the pipes. When the plumbers opened their shops the telephone bells were ringing merrily, and, naturally, they rubbed their hands and rejoiced; however, when they learned the cause of all this ringing, their joy was turned into mourning. Nevertheless, householders and patrons of plumbers in general continued to call them up, and the wires waxed hot over the messages carried, and the bells grew hoarse with ringing. The plumbers got tired with answering questions when they found that they could not make out bills for services rendered. The account published in one of the daily papers of this little difficulty is quite humorous. Many merchants and business men who could not afford plumbers had a very hard time. They went at work building charcoal fires under sinks and tying hot cloths around the pipes and getting down on their knees in various kinds of exercises, hoping to save the boilers and to keep the water-backs from burning out. About noon, however, the pipes were cleared and water again began to flow. Why ice should form in this particular manner, and that, too, on some occasions when the temperature is higher than on other days when no trouble has been experienced, we believe the engineers in charge of the Detroit water works have not explained.

THE death of Matthew Arnold, which occurred a short time since, lends special interest to whatever he has written, and our readers no doubt will feel a curiosity in knowing his position on architectural and art topics. From an article in the *Nineteenth Century* we make the following extracts, treating on architecture in America: "The charm of beauty which comes from ancientness and permanence of rural life the country could not yet have in a high degree, but it has it in even less degree than might be expected. Then the Americans came originally, for the most part, from that great class in English society among whom the sense for conduct and business is much more strongly developed than the sense for beauty. If we in England were without the cathedrals, parish churches and castles of the Catholic and feudal age, and without the houses of the Elizabethan age, but had only the towns and buildings which the rise of our middle class has created in the modern age, we should be in much the same case as the Americans. We should be living with much the same absence of training for the sense of beauty through the eye, from the aspect of outward things. The American cities have hardly anything to please a trained or natural sense for beauty. They have buildings which cost a great deal of money and produce a certain effect—buildings, shall I say, such as our Midland Station, at St. Pancras; but nothing such as Somerset House or Whitehall. One archi-

tect of genius they had—Richardson. I had the pleasure to know him; he is dead, alas! Much of his work was injured by the condition under which he was obliged to execute it. I can recall but one building, and that of no great importance, where he seems to have had his own way, to be fully himself; but that is indeed excellent. In general, where the Americans succeed best in their architecture—in that art so indicative and educative of a people's sense for beauty—is in the fashion of their villa cottages in wood. These are often original, and, at the same time, very pleasing; but they are pretty and coquettish, not beautiful."

MISFIT clothing and misfit carpets are frequently advertised in the large cities for the purpose of inducing purchasers upon the supposition that a great value will be obtained for a very small sum of money. Of course there is a great deal of humbug about this scheme of business, and it is fair to assume that of the misfit clothes and carpets, so called, which are sold in the market, a very small fraction are genuine misfits. Most of them have been made for the purpose, and the public have been humbugged into purchasing them. One of our Western contemporaries, with a keen sense of the proprieties of the case, referring to some of the ready-made house plans which are at present furnished by enterprising publishers, calls them "ready-made misfit building plans." The sale of plans of this kind, in the estimation of our contemporary, is increasing, and trade, it says, has become so profitable that reputable architects have entered the field. In the next sentence the assertion is made that these architects at once fall into the ways of the general manufacturer of designs and quite readily "catch on" to the one feature which makes the business profitable, and, indeed, possible—namely, gross misrepresentation of the cost of building after these plans. After reading this assertion and noting the characterization of the business above referred to, the question arises as to what is left of the reputableness of the architect after he has been guilty of gross misrepresentation as to cost. Perhaps our contemporary has used the term "reputable architect" inadvertently.

MANY prominent men have died within the last few weeks; among these may be mentioned Gen. Q. A. Gillmore, who may be characterized as having been a thorough and intelligent scientific as well as military man. He is known to our readers as the author of an important work on "Limes, Mortars and Cements," and also, perhaps, in connection with some of his work during and since the civil war. General Gillmore was born in 1825, and graduated at West Point with high honors in 1849. He was assigned to duty as officer of engineers, assisting in the construction of the great Fortress Monroe, as well as other fortifications. Returning to West Point, he served for three years as instructor in military engineering, and was afterward detailed to supervise the construction of various forts on the Atlantic Coast. During the war he displayed a courage in action, as well as military skill, which gained for him the rank of Major-General, with the command of first of an army corps and then of the Department of the South. The return of peace gave him leisure for private business, and, besides the Government work with which he was always intrusted, he was chief engineer of the Kings County Elevated Railway and a commissioner of the new Croton Aqueduct. Amid his many occupations, civil and military, he found time to write some of the most useful books on engineering subjects in existence. His work on "Limes, Mortars and Cements" is the best general treatise on the subject that the American student can obtain, and his little octavo book on "Roads" is also full of just such information as architects and engineers require. Besides these books, which are found in the library of nearly every engineer and of very many architects, he wrote two or three treatises on some of the military operations of the war.

ACCORDING to Pittsburgh papers the nucleus of an international organization of tinners and cornice workers, outside of the auspices of the Knights of Labor, was formed in that city a short time since. We understand that the union then organized will be attached to the Builders' League, and when other unions are formed will become a part of the American Federation of Trades.

THE PLATES.

In Plate XVII we show a cottage, by means of elevations and plans, estimated to cost some $1600. On the opposite page we show a $1400 cottage by means of a perspective and floor plans. Both of these designs are of interest, inasmuch as they meet the expressed want of a large number of our subscribers. The designs speak for themselves, and extended description is not necessary.

In Plate XVIII there is shown recent work in the arrangement and finish of prominent offices. The view represents offices of the Commercial Union Assurance Company, at Manchester, England. The drawing has the merit of being made from the work itself, and not a sketch prepared in advance. The woodwork was executed in Spanish mahogany. The various details will be appreciated by our readers.

In Plate XIX we show in sections, as well as by means of a general view, a very attractive design of a garden house. The walls are of brick and the roof is covered with tile. Glass casements light the building on every side and louvre boards are placed over them for ventilation. By a very neat device in the way of construction, space is contrived for blinds the whole width of each bay, and by this means a draft is prevented and the light excluded from any side, whether the windows are open or shut. A plaster ceiling is suggested to keep off excessive heat from the top. The lower part of the building is arranged as a garden tool house. The designer of this structure was Mr. Maurice B. Adams, F. R. I. B. A.

In Plate XX we show what one of our English exchanges characterizes as an Ingle Nook. It represents a room specially fitted up by one of the leading firms in London in order to illustrate furniture, fittings, &c., together with styles of decoration which they supply. It is of interest on account of the elements that it contains. The chair shown is a copy of a Chippendale. The angle cabinet is a pretty example of work of its type. The greater part of the furniture, including the panel wainscoting, was enameled in cream color.

Residence at Orange, N. J.

We present on the opposite page a perspective view of the residence of J. H. Noyes, Orange, N. J., built a short time since to plans prepared by A. B. Jennings, architect, No. 111 Broadway, New York. The floor plans and elevations are presented on succeeding pages. The design is one that embodies a number of features that are quite popular at the present time, and the finish is such as to render the building at once attractive and comfortable. In place of shingles or siding for the outside finish, slate has been used in a way that is attractive, rendering the house unique in appearance as well as weather proof.

The Art of Estimating.

BY C. POWELL KARR, C.E.

For several years we have observed in the columns of various architectural journals a recurrence of the old, old question, How can the cost of any building be estimated? and many a young builder or architect imagines there is some short cut which, if only known to him, would lead him out of the labyrinth of calculations to the desired goal—the sum total. Invariably the reply has been vouchsafed by the older and most experienced editors of many papers that experience and careful study will alone yield up the true, but tortuous, path of estimating, but up to the present time so few have essayed to explore the mysterious country for the benefit of the beginner that we have believed it worth while to offer a few suggestions and aids to those who may be in need of them.

The variation in the estimates of responsible contractors for any given piece of work is so astonishing as to indicate that something or many things are radically wrong in our ideas of values. On public work the engineer's estimates are generally 10 per cent. higher than the average estimate of all the bids received. The reason for this is the desire to escape the censure of public opinion, which invariably follows should the actual cost exceed the estimate; this custom, we believe, is pernicious in principle and misleading. The estimates among contractors upon such well known operations as excavation, masonry and stonework vary so greatly for the same conditions that our whole system of estimating needs a thorough revision. The questions naturally arise, Who shall be responsible for our estimates, and who shall assume its burdens and accept its meager rewards? In the consideration of such questions it is not necessary to our purpose to regard the individual who pays for the work, or whom we may say is the consumer; the question is too broad a one, and involving interests too great to consider merely the individual; his interests cannot suffer in the end if the good of the greatest number be conserved. The two classes who are the more directly interested in the problem are the designers and the builders; the former are our architects, engineers, decorators, sculptors and artists, the latter our builders, contractors and the men who perform the work that is to be done. Who shall do this work in the best manner and for the best good of all concerned?

A recent English writer has well said: "A young architect receives a commission to design a school or an infirmary, but before he can set to work he has to obtain information as to the rules of departments relating to a variety of details that are only to be mastered by a careful study of technical books. Questions involving widths of desks, their construction, area to be allowed to each occupant, imply some arithmetical preparation before the plans

can be drawn. A greater hardship to many is the preparation of valuations, and the cutting down of an estimate; but these are things so essential and necessarily bound up with the architect's work that unfitness for their prosecution is sufficient to disqualify him for the business."

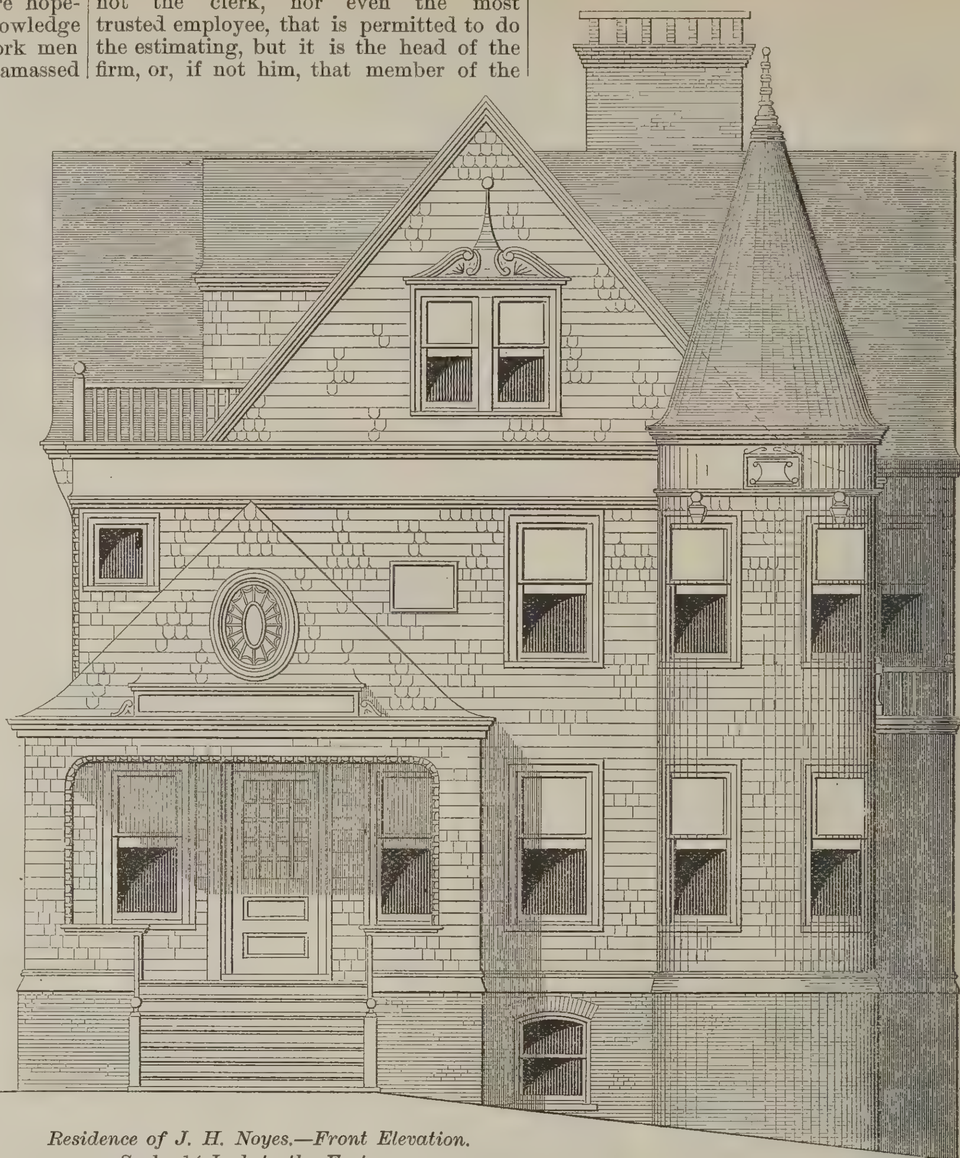
No greater hardship nor more tedious task could be assigned to even a young and enthusiastic architect than to be obliged to make a carefully worked out detailed estimate of cost, and many architects give up the task in despair, and place themselves entirely in the hands of the contractor, the custom in many offices being to submit the working drawings to builders and contractors for preliminary estimates, and so prevalent has this practice grown and so burdensome has it become to builders and workmen that at the meeting in February last at Cincinnati the National Association of Builders passed the resolution that where all bids were refused the compensation for estimates amounting to $5000 and under would be $25; $5000 to $50,000, $50; over $50,000, $100. This referred, we believe, to invited bidders only. The rules for estimating work were substantially as follows :

General plans, details and specifications when offered for final competitive estimates should be presented on a scale not less than ⅛ inch to the foot, should be done in ink or by some process that will not fade or obliterate and be complete in every part, and such portions as reqire a larger scale for a thorough comprehension of what will be demanded should be so presented; specifications should be definite; estimates should not be given to cover an indefinite depth of foundation; foundations which have to go below the depths shown upon plans should be paid for as extra work at prices agreed upon; the specification is to be the guide for estimating, and all demands made by the specification, unless objection be made thereto in writing when bids are submitted, should be covered in the estimate offered; improper demands made by the plans are not to be considered; grouping of special work must be mentioned and placed under appropriate headings; specifications must distinctly state when it is necessary to cut or change the work of one mechanic in the placing of the work of another; then the said cutting should be done by the mechanic whose work is so changed or cut, he being paid therefor by the mechanic whose work makes the cutting necessary.

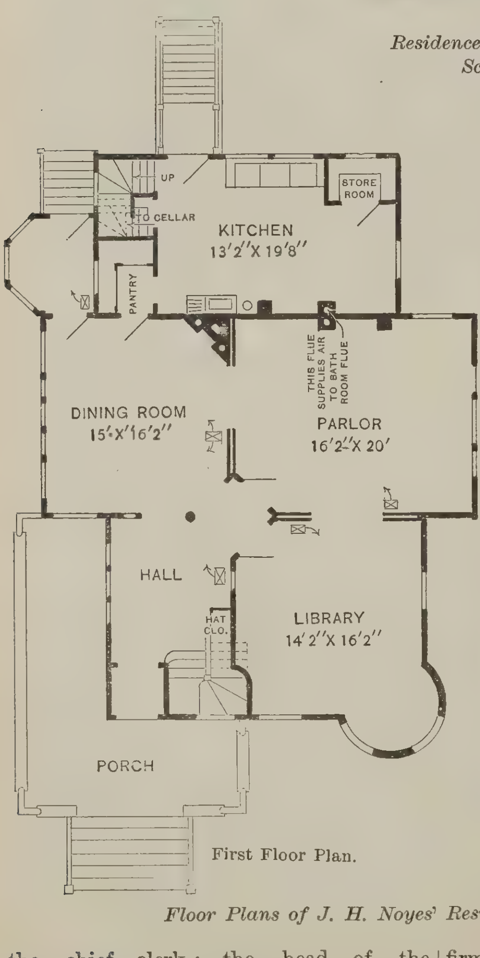
We can find but one clause to object to in all of the foregoing, and that is the supreme importance given to the specification over the drawings. We believe that in the present imperfect state of the art of specification writing such a clause would often work a great injustice to the owner of the property building. We believe that if specification writing were entirely in the hands of experts no fault could be found with the provision. The contractor himself, on the other hand, would frequently suffer great pecuniary loss on many a contract. If, for example, the builder were to consider himself bound to furnish only such material and work called for in the specifications, and yet be compelled by a clause to leave all his work in a finished condition, he might be compelled to put in work not called for in the specification but yet needful to finish his work, and yet he could not demand remuneration for it because it was not specifically mentioned in the articles. It might, however, be shown in the drawings; but if he rejected the legal claims of the drawings at the outset he could not consistently appeal to them at the close of the work; and were it to be established that the drawings were not to be considered legally essential to the fulfillment of the contract, it would not be long before the architect would insist upon declining to furnish any detail drawings and leave the builder in a network of confusion and disorder. The proposition is really untenable. The art of the designer would suffer untold degradation and decline were details and sketches to be omitted, which are in reality but interpreters; aye, the universal language and expression of the specifications, and the two must always go hand and hand together, each explaining and unfolding the other. Should they so encroach upon each other as to conflict, the written instruction of the designer must decide which is to be taken. On the whole, the rules are wise, just and progressive, and in the one word, comprehensive, lies the gist of the whole matter.

Specifications should be comprehensive, thorough, should show an expert's knowledge of the details and technique of every trade employed in the erection of a building. One might well say such a knowledge were impossible, but nothing is impossible to any man who is determined to learn and to surmount all obstacles. The rock upon which all of our architects, engineers, build-

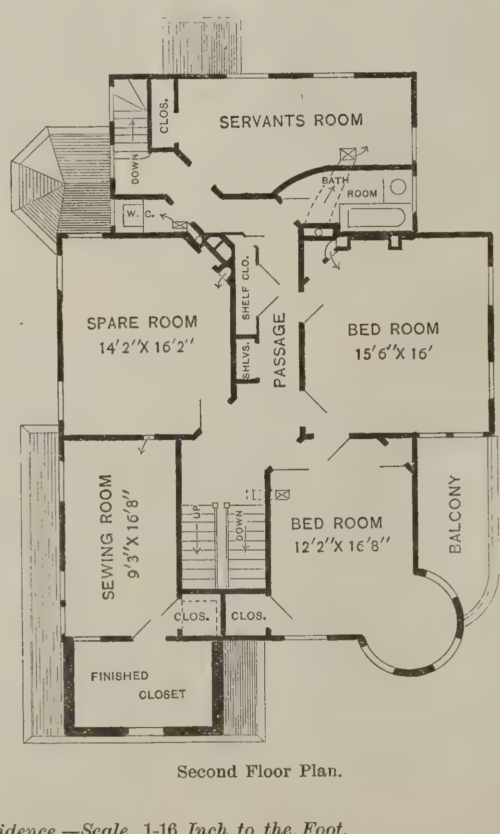
Residence of J. H. Noyes, Orange, N. J.—A. B. Jennings, Architect, 111 *Broadway, New York.*



Residence of J. H. Noyes.—Front Elevation. Scale, 1/8 Inch to the Foot.



First Floor Plan.



Second Floor Plan.

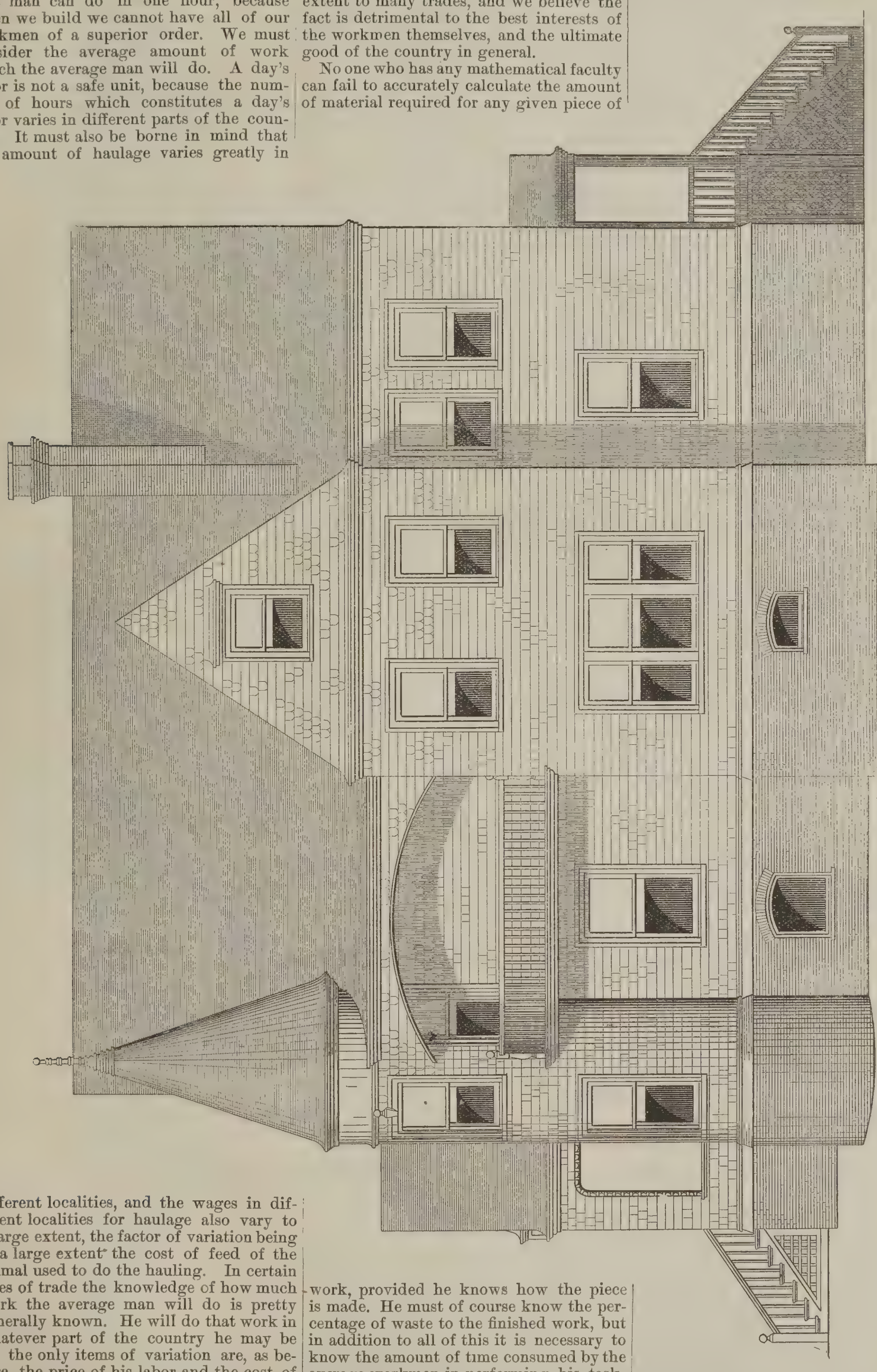
Floor Plans of J. H. Noyes' Residence.—Scale, 1-16 Inch to the Foot.

ers and contractors split, and are hopelessly wrecked, is this want of knowledge of details. In certain lines of work men have become prominent and have amassed a competency by becoming so thoroughly proficient in the field of work in which they are engaged that they are employed to write specifications, and are successful, but in the particular field of the architect and builder, as distinguished from the engineer and contractor, this proficiency has not been attained, and it is the adequate explanation of the wide differences existing in estimates and the serious losses so often met with in the building trades. It is not to be doubted that an architect must be so well acquainted with all the details of a building as to be able to classify and assign to each trade its proper amount and kind of work, but it is still an open question whether he ought to be able to state the value of such work wherever it may occur. Estimating in this country is in too formative and primitive a state at present to enable a man whose best work is to be wrought in artistic expression to successfully master the intricacy of so many thousands of items of cost. But the builder's position is so utterly different that his aspect of the question must be looked at with closer attention and from a nearer standpoint. The practice of the artist and the artisan are so different in this regard as to emphasize our meaning. For example, in a large office the architect assigns the estimating to one whose sole duty is to estimate, or to the chief clerk; the head of the office seldom undertakes the uncongenial task. In the artisan's office it is not the clerk, nor even the most trusted employee, that is permitted to do the estimating, but it is the head of the firm, or, if not him, that member of the firm whose mathematical instinct is the best developed, who makes the estimate, and upon whose skill and care the firm risks its reputation and its fortune Experience has forced home this practice in every successful builder's office in this country. We have in mind a large house in the iron trade in this city, who for many years have been successful contractors and bidders upon their line of work, and the head of the firm naturally was the financial post of the house, perfectly incompetent to make an estimate himself. Although familiar with the general run of the business and its affairs, he was obliged to let his partner do all of the estimating. This man had made the study of the details of his line of business a life work; every item of supply, alteration and finish was carefully classified. It was known to him just how long it would take a competent man to do any given piece of work in his line of business. His rule in estimating was to refer everything, so far as practicable, to surface measurement. The square foot unit was supreme in that office.

When an estimator knows, for example, how many square feet of 1-inch sheathing boards the average carpenter can lay in one hour he has established a basis upon which all future calculations can be made; he then has only two items to keep posted upon

—the customary wages of the said carpenter per hour, and the price of lumber delivered in the particular locality in which he designs to build or is building. We protest against taking as a unit what is the greatest amount of work the best man can do in one hour, because when we build we cannot have all of our workmen of a superior order. We must consider the average amount of work which the average man will do. A day's labor is not a safe unit, because the number of hours which constitutes a day's labor varies in different parts of the country. It must also be borne in mind that the amount of haulage varies greatly in different localities, and the wages in different localities for haulage also vary to a large extent, the factor of variation being to a large extent the cost of feed of the animal used to do the hauling. In certain lines of trade the knowledge of how much work the average man will do is pretty generally known. He will do that work in whatever part of the country he may be in; the only items of variation are, as before, the price of his labor and the cost of the material. In the roofing trade, for example, the amount of work the average roofer will do for each kind of roofing work done in this country is generally known. The competition in the roofing trade has made this knowledge a necessity, but unfortunately it is not so well established in the mason's work, for example. Few men will agree as to the number of face brick the average mason will lay, corner brick and chimney work especially, and this same uncertainty applies to some extent to many trades, and we believe the fact is detrimental to the best interests of the workmen themselves, and the ultimate good of the country in general.

No one who has any mathematical faculty can fail to accurately calculate the amount of material required for any given piece of work, provided he knows how the piece is made. He must of course know the percentage of waste to the finished work, but in addition to all of this it is necessary to know the amount of time consumed by the average workman in performing his task. So far as we know, no carefully prepared scientific attempt has been made to thoroughly canvass the various trades connected with the art of building in order to obtain the necessary data. That this will be the more readily appreciated, suppose it were found necessary to have some work done by a joiner, for example, on some woodwork, the said work being in the form of repairs, how few there are who could tell you before the job was finished what it would cost to have it done; how invariably the reply is that it will be impossible to say what the cost will be until it is known how much time has been spent by the workman in making the repairs; but who will deny that the workman or his employer ought to be so



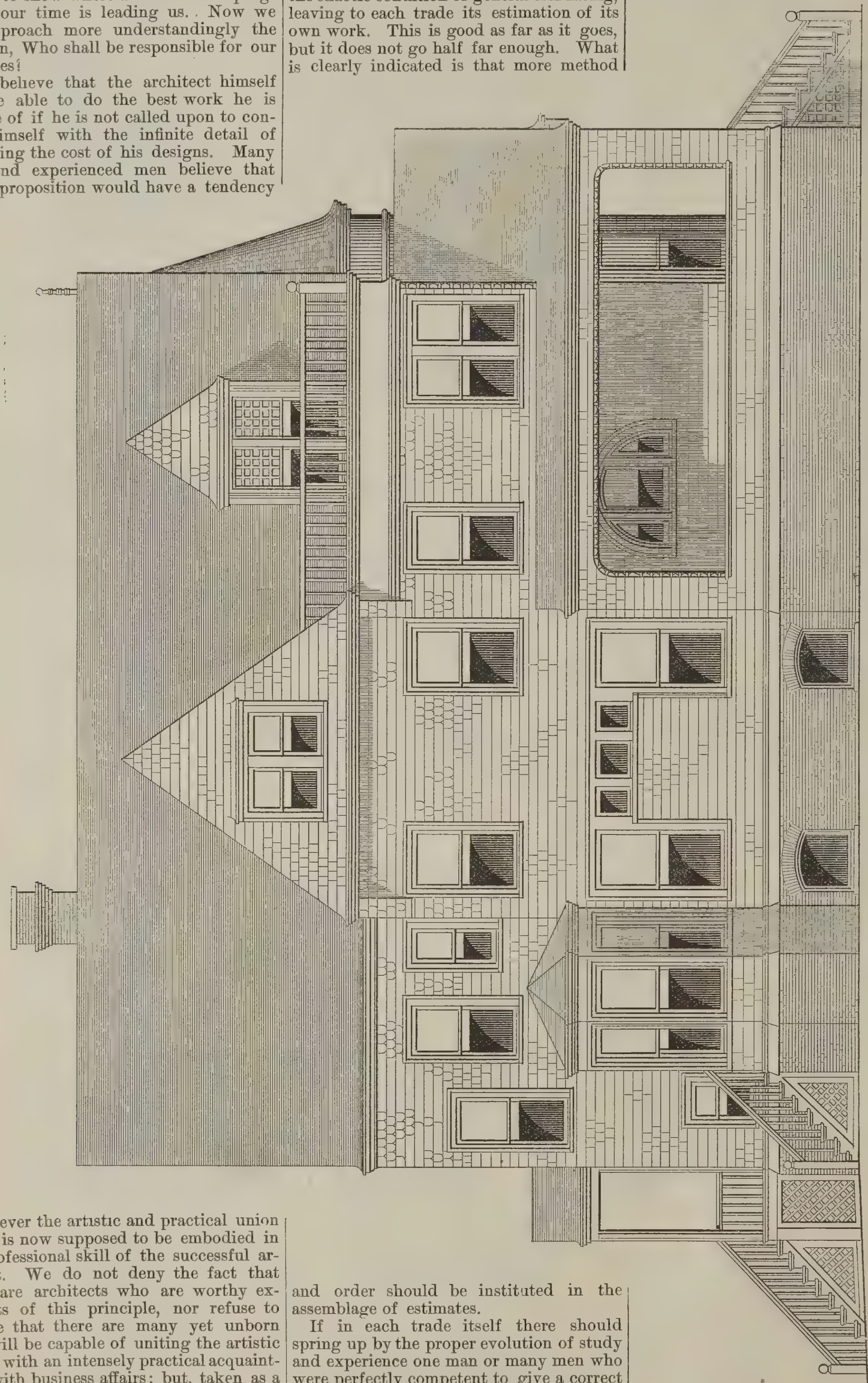
J. H. Noyes' Residence.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

skilled in estimating that he could, if he desired, give an estimate that would not vary 3 per cent. from the actual cost, with a due allowance for his own remuneration. We have cited these few familiar examples merely to show where and how the progress of our time is leading us. Now we can approach more understandingly the question, Who shall be responsible for our estimates?

We believe that the architect himself will be able to do the best work he is capable of if he is not called upon to concern himself with the infinite detail of estimating the cost of his designs. Many wise and experienced men believe that such a proposition would have a tendency to dissever the artistic and practical union which is now supposed to be embodied in the professional skill of the successful architect. We do not deny the fact that there are architects who are worthy exponents of this principle, nor refuse to believe that there are many yet unborn who will be capable of uniting the artistic nature with an intensely practical acquaintance with business affairs; but, taken as a whole, and applied generically to the whole profession, we challenge the assertion that up to the present time the two great factors have been successfully assimilated by our professional men. I do not say this in any spirit of unkindly criticism, but confess it as a lamentable fact.

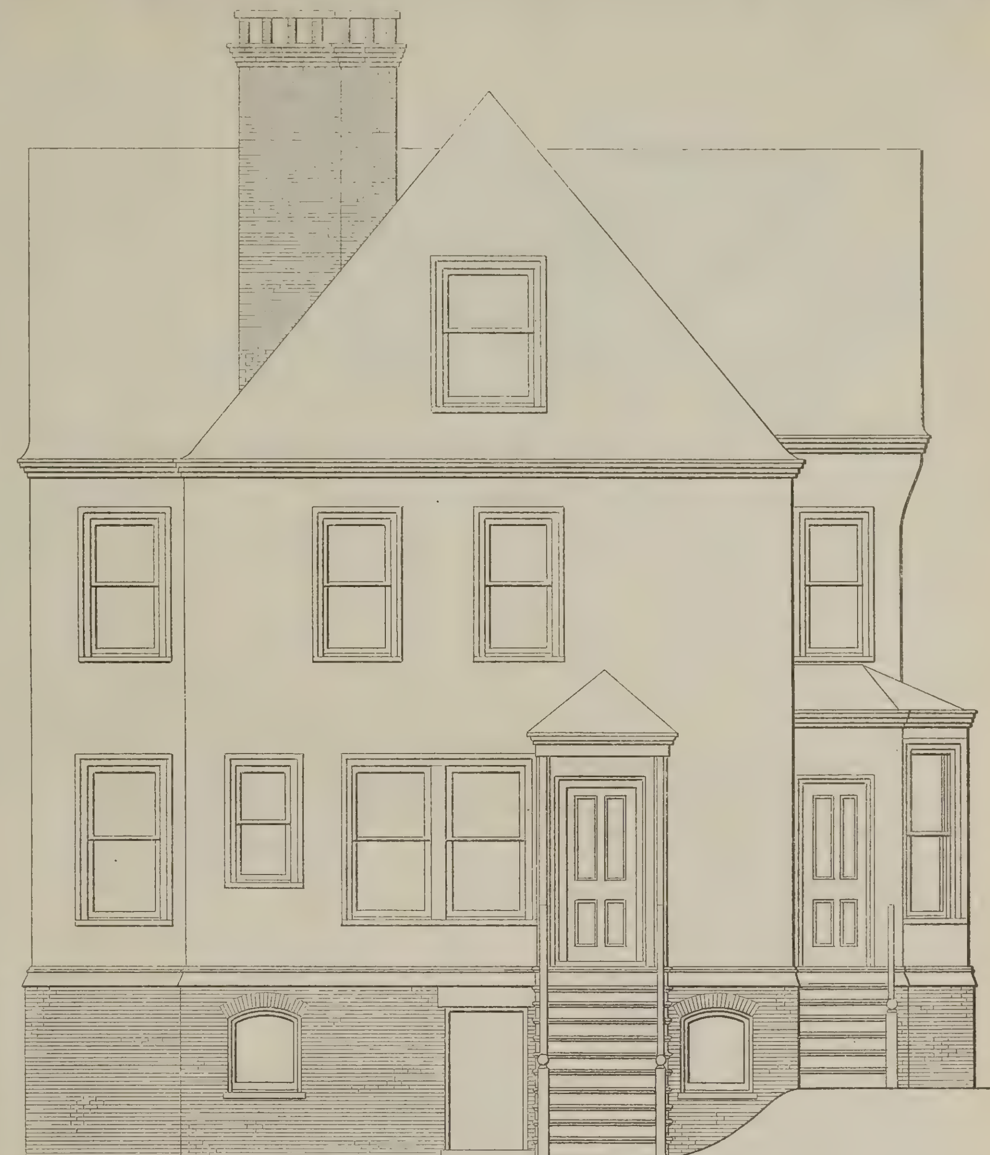
The rules recently adopted by the National Association of Builders prove conclusively that the great and united intelligence of that body points clearly to more distinctive and sharply defined principles of estimating which are to be followed in the future, but no step was taken to unite the chaotic condition of general estimating, leaving to each trade its estimation of its own work. This is good as far as it goes, but it does not go half far enough. What is clearly indicated is that more method and order should be instituted in the assemblage of estimates.

If in each trade itself there should spring up by the proper evolution of study and experience one man or many men who were perfectly competent to give a correct estimate of the cost of any given piece of work in this particular trade in any or many of the States of the United States, such men would find themselves amply rewarded for their particular knowledge, and such knowledge would be of the utmost value, not only to architects, but to engineers, builders and contractors and the public at large. We do not believe there are many men in this country who in any trade connected with building operations can give correctly the cost, for example, of one square foot of any piece of work with which he is familiar in all the counties of any State in this country where building is going on, not even within the limit of 3 per cent. excess or deficit of the actual cost. That one could become so expert upon such work in this country that a remark of this kind could not be truthfully made no one will deny, and

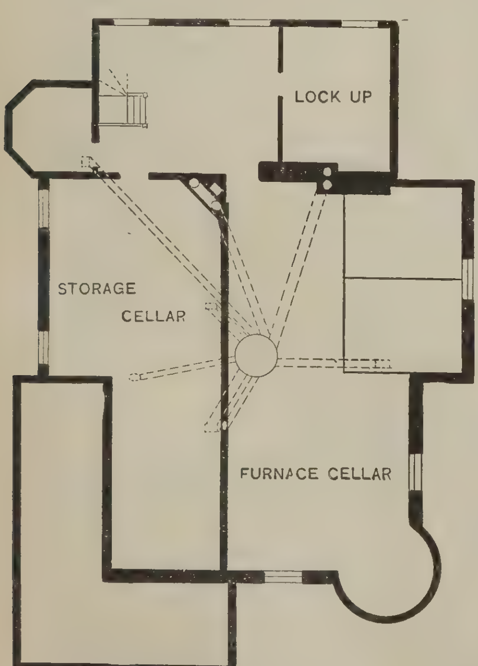


J. H. Noyes' Residence.—Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

that it can be made forcibly illustrates the chaotic condition of estimating in this country. Architects in New York accept commissions from Portland, Me., to Los Angeles, and contractors cover an equally large territory Even within much smaller limits the same assertion is almost equally true. To become expert upon estimating, what must a man do and know? In his chosen field he must first know every material that is used, its methods of manufacture, its quality, its market value, and the reason for its use. He must know the kind of labor employed upon such material, a fair knowledge of the skill required to perform such labor, and the amount of labor required to perform a certain unvarying unit of the work to be done--viz., a square foot, a lineal foot, a cubic yard, or other established measure. This work must be thoroughly done, but it can be well done, as the writer has seen demonstrated again and again. He must have tabulated sheets of the value of labor per hour in every known labor center in this country, and keep his lists up to date. He must be an omnivorous reader of the published lists of bidders' figures on contracts, that so many of our valuable technical journals now make a feature of, and to which the writer feels an indebtedness he knows he can never repay. He must, if he can, keep a general track of the rise and fall of values. If he has had the training of an engineer he can do this to the best possible advantage by keeping a series of profiles of the value of labor per hour in various localities. This will give him a graphic map, which will enable him to intelligently estimate at a moment's notice in any locality in this country. The value of material could be mapped in the same way. It is also somewhat singular that the opinions as to what constitutes a fair return on the money invested by the contractor vary so largely in different parts of the country. In order to arrive at this element in the calculations an estimator must keep the run of the loanable value of money. Where rates are low percentages are lower, and conversely. The fairest criteria, we think, may be based upon the interest on bond and mortgaged real estate. This kind of investment has permanence, and is free from the manipulated fluctuations of railway securities. The resulting estimate will be safe and conservative.



J. H. Noyes' Residence.—Rear Elevation.—Scale, 1/8 Inch to the Foot.



Basement Floor Plan.—Scale, 1-16 In. to Foot.

The preliminary work to be done to prepare the way for an accurate estimate of cost of any building is:

1. The gathering of the facts in regard to material of every kind and nature that enters into a building.

2. The kind of labor and its amount in the execution of the work to be done.

3. The establishment of a system of reference tables or profiles, which will be an epitome of the estimator's information in the field he desires to cover. In regard to aids in obtaining this information we have space only to mention a few.

The most important information to be obtained, because it is of the sort that is generally unknown, is the amount of work a man can and ought to do in an hour's time. The best method we have found to obtain this kind of information is to question the workman himself. It sometimes needs considerable tact and shrewdness in order to obtain from the workman himself what he considers a fair estimate of an average man's work for an hour. It is also a kind of work that needs a spirit of patient inquiry, a comparison of replies, and a collation of results, in order to deduce from them all a fairly average result. This may seem at first sight a slow and tedious process, but it is essentially the only one that is safe and conservative.

To obtain information in regard to materials the estimator must industriously collect from manufacturers and dealers in supplies their business circulars, catalogues, price lists and advertisements of their wares, and, above all, do not forget their discount sheets. Arrange and classify their contents according to the trades they refer to, and index them in some systematic manner, so that a reference to anything they contain may be had without a moment's delay.

To keep posted on novelties, new but meritorious inventions, constant reference must be had to the various trade and technical journals. The same journals will contain summaries of bids on important work, which must occasionally be analyzed and referred to items as a check upon the estimator's standard of values. It must be constantly borne in mind that it is the actual value which is wanted of a piece of work, not merely the skeleton representative which is embodied in the word price; many a piece of work may have several prices to different men, but it can only have one value, and that value is the amount of labor done upon or with a given material in a certain unit of time. To reduce his work to an admirable system a man must have an orderly mind and be

possessed of methodical habits. Much will depend upon the system to be adopted; each individual must work out for himself a system of reference that will be to himself individually the most serviceable. His work and methods must be logical, his results accurate and obtainable. The most authoritative sources of the price of labor (we do not say its value) is to be found at the rooms of the various associations of builders and manufacturers in all of the large cities of the country. Many trades journals are in the habit of publishing at various intervals the prices paid per day to different sorts of skilled labor, and many a missing link can be obtained from such tables.

The evidence presented here is somewhat *ex parte*. The answers to the queries propounded cannot be deduced from any series of arguments. What we have pointed out is something to be done in the future, and will, we believe, shape itself to the current needs of our building art. In older countries than ours, confessedly behind us in push and progress, the tendency is to a more systematic division of labor in the high art of design and construction, and the ends to be attained are more the outgrowths of experience than a change in the nature of reforms, and it is because of our lack of experience in the development of all phases of art that we are in our present chaotic condition as to the estimation of the cost of buildings.

In France the Société Centrale des Architectes Française publishes the "Série de Prix," or official price list of building materials, which is used by every contractor in making his estimates. We have nothing approaching such a list in this country, and probably never can have, owing to our geographical magnitude; but, if we had, there would be no opportunity for a man to become proficient in the art of estimating. In England Laxton's annual price list, now a volume of more than 600 pages, is so complete as to be used constantly by contractors in compiling their estimates for all large tenders; and we learn that it is now proposed to erect a large building in London for a reference museum of building materials. The general scheme of this museum is in addition to other desirable ends to present a classified arrangement of such materials, and will contain a complete set of catalogues, price lists, &c., of all manufacturers and dealers in the kingdom, kept up to date. If such museums could be established in, say, Boston, New York, Philadelphia, Cincinnati, Chicago, St. Louis, Omaha, Denver and San Francisco as centers of information, the task of estimating would soon be resolved into its proper shape and become what it should be, a well established art.

Moving the Brighton Beach Hotel.

In a recent issue we referred to the plan of moving the Brighton Beach Hotel, Coney Island, back from the waters of the ocean to a point inland where it would be safe from the ravages of the sea. When this hotel was built some 10 years since there was a beach of upward of a thousand feet in front of it. Gradually the water has encroached upon the land until last year the waves broke under the piazzas and clearly indicated that if the building were allowed to remain in its position it would only be a question of a very short time when it would be destroyed by the waves. Bulkheads had been built in front of the hotel in the past, but the sea swept them aside. The company finally decided to move the building inland some 600 feet. And then the question arose, How could it be done? The building cost about $250,000. To tear it down and rebuild would be a great expense, and it was too heavy and covered too much ground to think of moving it in the ordinary way, with skids and jack screws. It was the idea of Superintendent Morrow, of the Brighton Beach Railroad, that the moving could be done on flat cars and that locomotives could do the pulling. The idea was startling, but investigation proved that it was practicable, and the scheme was adopted. Work was begun by the contractor in November last, and the moving took place in the first week in April. The building is estimated to weigh 8,000,000 pounds. Twenty-four tracks were built under it, and the weight was supported by cars on these tracks. Each of the end cars was supplied with a pulley block, attached. Then, up the respective tracks a little way, were other blocks bound down by chains to the rails, which were weighted by heavy timbers spiked to keep them from rising or spreading. About 2 miles of 1½-inch rope ran through these blocks and led to the locomotives that were standing on the middle tracks ready to grapple with their heavy load. Six locomotives were employed. Three were on each track, coupled together. The engines looked like so many little ponies hitched to the building when the actual work was to begin. It seemed laughable to think of their moving the five-story structure that towered above them on either side. However, the experiment proved the correctness of all the calculations, and at the first attempt the building began gradually to move in the desired direction. We anticipate our story, however, for we have omitted interesting particulars with reference to the preparations for moving. The first step taken was to drive piles under the entire front of the hotel. As already mentioned, the waves had torn away the sand, so that the building literally hung half way over the water. It was no small undertaking to build 24 railroad tracks on these piles and to lift the structure, so as to make it rest intact and absolutely level on the flat cars. Careful calculations and thorough engineering, together with good workmanship, however, accomplished all that was necessary. Nevertheless, those who were in charge could not avoid feeling somewhat anxious as to the result. Supposing the weight of the hotel had sunken the outer ends of the rails even a trifle; then the building as soon as started would very probably go the wrong way and fall wrecked and ruined into the sea. Then, again, the question arose, would the long structure stand the strain of so many ropes; would it not be pulled apart? Could the power of those six locomotives on different tracks be applied so gradually and equally as to move the whole mass at once? Would not the slightest jar crack the walls and make it necessary to pull the building down? That these possibilities existed it was freely admitted, and they added to the interest of the first trial of the experiment. There was another element of danger about which no one talked, but which was thought of by several engineers. Would the hotel, if started, gather any momentum? That this was a most serious question was evident from the fact that there were no brakes on the cars and nothing on hand to block their wheels. What would become of the crowd who went down to witness the moving, and what would become of the locomotives, and where would an 8,000,000 pound hotel stop if it began to roll along on its own account? The engineer in charge, however, made sure that the tracks were perfectly level, and, therefore, believed that the hotel would, if moved, be held by its weight on the spot where it stopped.

The appointed hour was reached. A shrill whistle was heard and six locomotives began to puff. They started, says an observer, at the rate of about a mile in two weeks, but even that speed caused the ropes to tighten and the blocks to groan, and, to the delight of all, there was a cry from a workman on the south end of the building of "she moves." After a little pulling the locomotives stopped and measurements were taken to determine whether the two ends were moving together. The difference on the first pull was less than ½ inch. Two more pulls were then tried, one of 18½ feet and the other of 24 feet, with the same result. It was demonstrated that the locomotives were perfectly able to draw the building safely and easily. The tackle was then readjusted and then another pull was taken. The last pull of the day was 67½ feet, making a total of 117 feet which the hotel was moved the first day. The work of getting the building to its final resting-place occupied a number of days, but the details were only a repetition of what occurred on the first. The cost of moving this building upon this novel plan is an unknown quantity at the present time. A competent engineer estimates it, however, at something less than $50,000. The most noteworthy fact to be observed above is that a new method of moving great structures has been discovered. Inasmuch as the sea is encroaching upon other buildings belonging to the same company, it is not unlikely that the same plan will be tried upon them.

Non-Inflammable Wood.

At the request of the Belgian Minister of Public Works, says the *Journal of the Society of Arts*, M. Boudin and M. Donny, professors at the Ghent University, have conducted a series of experiments and investigations in connection with rendering wood uninflammable. The following *résumé* embodies the conclusions at which they have arrived:

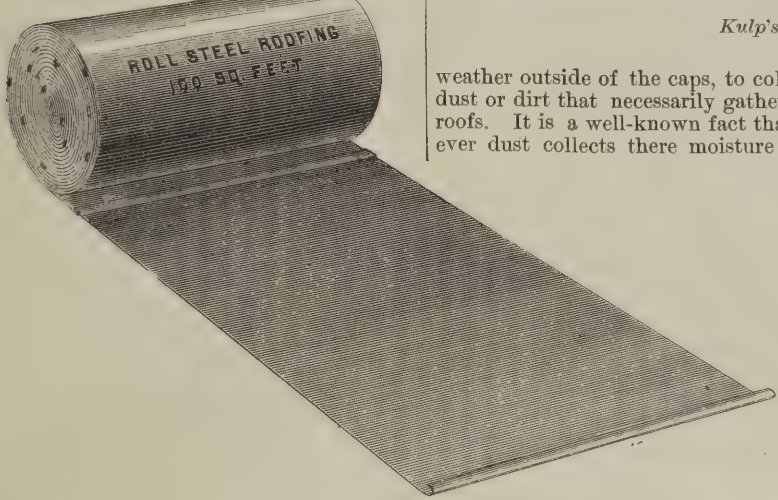
Although wood cannot practically be rendered so fire-proof as not to be destroyed by heat, it is very possible to deprive it, to a considerable extent, of the property of catching and communicating fire, and to this end it is sufficient to coat the wood with a suitable composition. It is not, however, sufficient that this composition or substance possesses in a high degree the property of rendering wood uninflammable; it must also fulfill other conditions. The treatment must not involve an expense out of proportion with the purpose to which the wood is applied, nor should the process be such as to delay the rapid execution of works. Nor should the substance employed be liable to attack any metal parts which it may be necessary to use with the wood. The process should also be of easy application, with a brush, for instance, the only manner in which it can be applied to existing structures. The wood thus coated should present a neat and tidy appearance, and should also be capable of receiving a coat of ordinary paint over the fire-proofing composition; nor should one or the other coat be subject to alteration after a moderate lapse of time.

It follows from the above considerations that wood cannot be rendered incombustible, or, more strictly speaking, non-alterable by heat; but its non-inflammability may, to a considerable extent, be insured, so as to preserve buildings from a limited and temporary fire—at any rate until assistance arrives. The methods of preserving wood against fire are of two kinds: the injection of saline solutions and the application of a paint or coating. The former appears but little practical. In the majority of cases, coating with a brush is the only practical solution of the question, and the substances most to be recommended for use in this manner are cyanide of potassium and asbestos paint.

ROOFING NOTES.

Roll Cap Sheet Steel Roofing.

The Lloyd Iron Roofing and Paint Company, corner of Lake and Clinton streets, Chicago, Ill., are just introducing a new form of metal roofing, a patent on which was granted a short time since. It is described in their new catalogue, which has just been issued, as roll cap sheet steel roofing. This designating term is comprehensive, and indicates in brief compass the exact nature of the finish. Sheet steel is the material used. It is furnished to the trade in rolls, and in laying a cap of peculiar form is employed. Referring to the engravings, Fig. 1 shows the roofing



Roll Cap Sheet Steel Roofing.—Fig. 1.—Rolls as Shipped.

put up in rolls, as it is furnished to the consumer; Fig. 2 shows the cleat in the flat, and Fig. 3 shows it formed, ready to attach; Fig. 4 is the cap used in laying this roof, while Fig. 5 shows a portion of a building covered by this roofing and indicates the method of application, and shows at a glance the peculiar nature of the cap. Referring to the process of laying, the strips, after

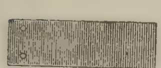


Fig. 2.—Cleat in the Flat.

Fig. 3.—Cleat Formed.

being cut to the proper length for the building, are tonged up in the usual way. The cap, which it will be noticed consists of a strip of metal formed in the general shape of a letter "S" with one end much elongated, is then put in place, after which the cleats are applied as shown by EE in the engraving. The next strip of metal with its edges turned is then brought into

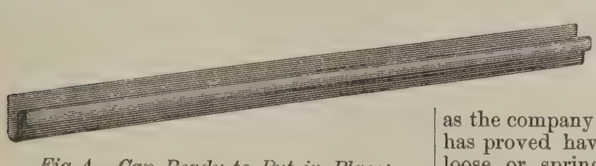


Fig. 4.—Cap Ready to Put in Place.

position, and the cap is turned over, making a finish, covering at the same time the tops of the cleats and also the upturned edge of the strip of metal last put in position. By this means a very excellent finish to the standing seam is provided, the strips are left with abundant opportunity for motion due to changes in temperature, and, withal, the work is easily and readily performed. The advantages claimed by the company are enumerated as follows: First, there are no cleats exposed to the weather outside of the caps, to collect the dust or dirt that necessarily gathers on all roofs. It is a well-known fact that wherever dust collects there moisture will be retained. The avoidance of dust, therefore, is a security to the roof. Second, the cap is so constructed that it really be-

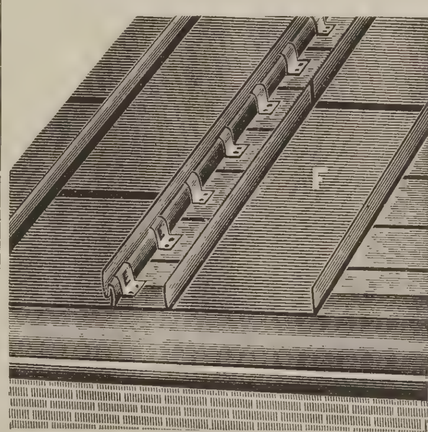
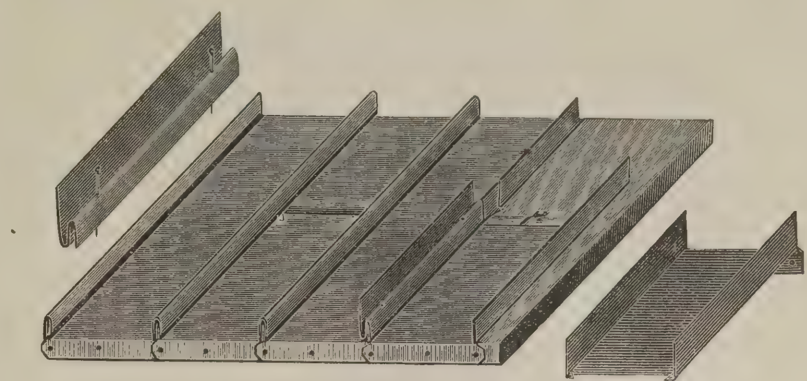


Fig. 5.—Section of Roof Covered with Roll Cap Steel Roofing.

comes a part of the single edge or standing seam by means of the ordinary cleat, such as tinners have always used for laying standing-seam roofs. Third, there are no punctures or indentations or rivets in or through the cap, which, as the company point out, past experience has proved have the tendency to break loose or springapart by the action of the elements.

Kulp's Tight-Cap Roofing.

We illustrate in the accompanying engraving a new form of cap roofing that is being introduced by the Tight-Cap Roof and Corrugated Iron Company, 409 South Canal street, Chicago, Ill. The engraving shows the features of the roof in so thorough a manner that a lengthy description is scarcely necessary. The cap that is employed is shown at the left. The way the edges are turned, preparatory



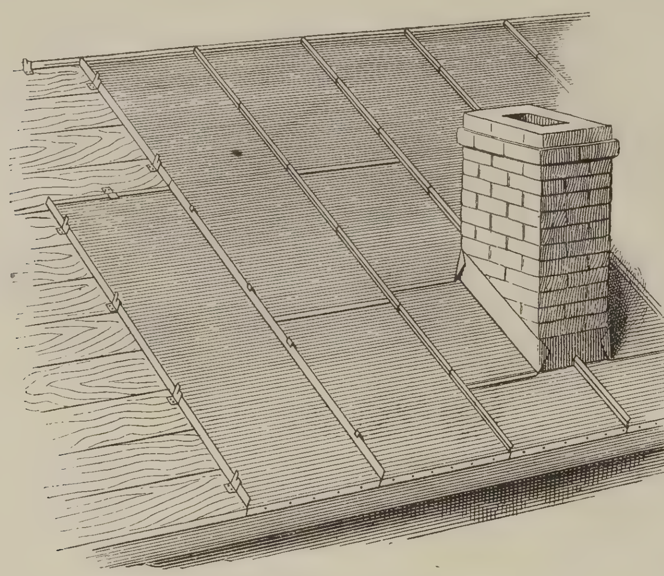
Kulp's Tight-Cap Iron Roofing.

to receiving the cap, is shown by the detailed view at the right. The cap in place, partly turned, is shown on the second standing seam from the right-hand edge, while the finished seams are shown to the left. A special advantage to which the company direct attention is that the sheets composing the roof are in no respect cut or perforated. Instead of cleats long nails are used, going down through the caps and between the upturned edges of abutting sheets. After nailing in this manner the long side of the cap is turned over, completing the seaming and entirely covering the nail heads from the weather. The company direct attention to the fact that expansion and contraction are well provided for, and that the construction is so simple that any one can easily put the roof in place. No tools are required save a pair of tongs, hand snips to cut the iron and a jointer to make end joints. The iron is supplied to the trade in rolls containing 100 square feet. The individual sheets are 8 feet long and 26¼ inches wide. The pamphlet which the company have recently issued contains illustrations and description of the roof above referred to, together with reference to corrugated iron, both straight and curved, corrugated iron ceilings, shutters, siding work, &c. Directions are also presented for laying the different styles of roof which this company manufacture.

Crimped Cap-Seam Roofing.

In the engravings upon the next page we illustrate a form of cap-seam roofing that is being introduced by H. S. Northrop, corner of Centre and Franklin streets, New York City. The finished seam is crimped or bent midway of its hight in a way to fasten the cap securely in place, which gives the distinctive name to the roofing which we have used above. The large view which we present upon that page shows the appearance of a finished roof. In this respect it will be seen that it does not differ in many details from other roofs with which it may be compared. It has the advantage of concealing the cleat, and thus protecting all parts from the weather. The cleat, a full size view of which is shown, is of the bifurcated variety. It is nailed in place alongside the upturned edge of one of the sheets and one part or prong is turned over the seam. After the adjacent sheet has been put in place the opposite part or prong is bent over it. At this stage the work is in the position shown by Fig. 5, from which it will be seen that each of the abutting sheets has equal support, so far as the cleats are concerned. The cap used in this roof is of the form shown in Fig. 2. It is put in place over the edges already referred to, and then, by the aid of an ingenious tool, the finished seam is bent or crimped, as shown in Fig.

6. The material is supplied to the roofer in sheets 8 or 10 feet long, as may be desired. The sheets are 26 inches wide and



Crimped Seam Roofing.—Fig. 1.—Perspective View.

finish 24 inches to the weather. The side edges are turned and the sheets are packed in crates. Fig. 4 illustrates full size section through the cross seam, to make which a hand folder is supplied to the roofer. A new catalogue which Mr. Northrop has recently issued, in addition to the roofing here illustrated, contains engravings of ceilings made of sheet iron in large variety. The pamphlet is one which many of our readers will be glad to possess and file away for future reference. There are also illustrated iron siding, both beaded and molded, and oval crimped roofing.

Fig. 2.—Section of Cap.

Metal Roofs.

John Slater, an eminent English architect, in a paper read before the royal institute some time since, discussed roof covering in general, and, in the course of his remarks, offered the following concerning the metal roofs which are employed in different parts of the world:

The structural arrangement of a building frequently renders it impossible to form a sloping roof over all parts of it, and hence flats are necessary. When this is the case, metal coverings are the best that can be adopted. Formerly it was not uncommon in buildings where cost was not a consideration to use sheet copper for covering flats or slight slopes, and a large portion of the roof of the British Museum galleries is laid with this material. Copper forms a very light covering, as it may be safely used in sheets not more than 0.03 inches thick, which would weigh about 20 ounces per foot super. Copper slowly oxidizes when exposed to the air, but the oxide does not eat into the substance of the metal as is the case with iron; it seems rather to form a protective coat. The cost of copper renders its use very limited, and zinc has to a large extent taken its place.

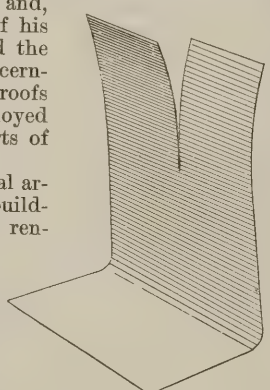


Fig. 3.—Cleat, Full Size.

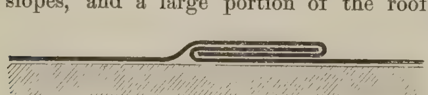


Fig. 4.—Section of Cross Seam.

Zinc is also a very light covering—in fact, its specific gravity is slightly less than that of copper, but it has not a good reputation, owing to the fact that on its first introduction it was used in very thin sheets and sufficient care was not taken in laying it. Its expansion is greater than that of any other metal, and therefore it should always be laid with ample play or it will soon buckle and crack. The Vieille Montagne Company have greatly improved the methods of laying zinc, and they have also introduced thicker sheets than could previously be obtained, and if zinc is used at all it should never be less than No. 16 gauge, which weighs about 24 ounces to the foot super., and is as nearly as possible $\frac{1}{32}$ inch thick. Zinc resembles copper in the fact that it oxidizes on the surface only, but in smoky districts it will not last at all, as sulphuric acid completely destroys it. The surface oxidation only of zinc when exposed to ordinary atmospheric influences suggested the attempt to prevent the rusting of iron by giving it a thin coating of zinc. This led to the production of galvanized iron for roofing purposes. The galvanizing process consists in first precipitating tin upon sheets of iron by means of weak galvanic action, and then placing the plates in a bath of liquid zinc. Iron thus treated will last, under favorable circumstances, for a long time, but when used for roofing it is almost impossible to avoid nailing the sheets in some places, and where the nail holes occur moisture invariably makes its way to the iron itself, which rusts internally, and the thin zinc coating then comes off in flakes. What was previously stated as to the action of sulphuric acid upon zinc will show the utter uselessness of galvanized iron in smoky districts.

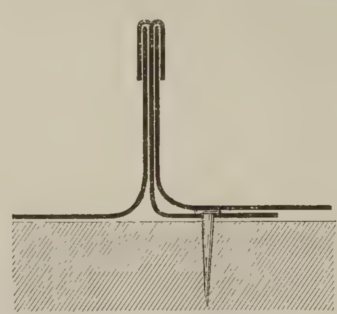


Fig. 5.—Section of Seam and Cleat.

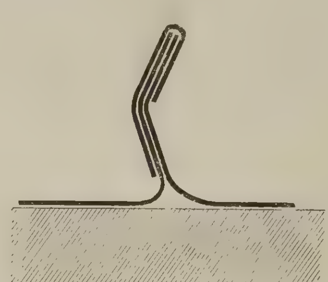
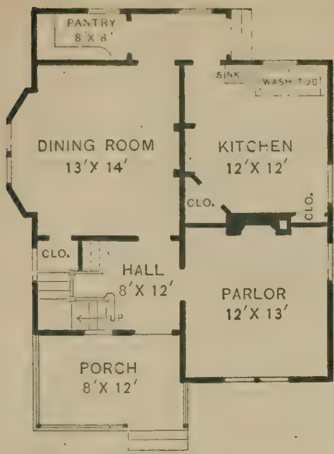


Fig. 6.—Section of Finished Seam.

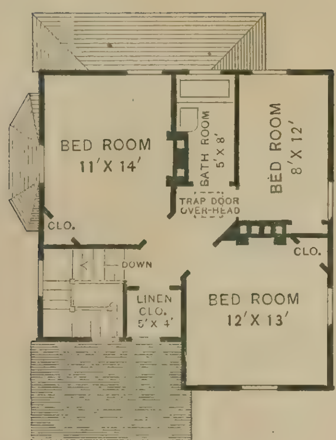
The most durable metal covering for roofs is milled lead. This is lead which, after being cast, is passed through a mill between rollers adjusted so as to give the requisite thickness to the sheets which are rolled out. This thickness varies from 0.075 inch to 0.236 inch, the weight of these qualities being 4 pounds and 14 pounds respectively per superficial foot. The qualities chiefly used for roofing are the 5, 6 and 7 pound lead, the latter being the lightest that should be used for flats or gutters. In laying lead on flats they should be close boarded, and care must be taken to allow for the due expansion and contraction of the metal; consequently the joints of two adjacent sheets must not be soldered together. In order to prevent the water from penetrating at the joints, fillets of wood 2½ x 2 inches, rounded at the top, called rolls, are nailed to the boards, and one sheet of lead is dressed close up to and half way over the roll, while the next sheet is brought up to the opposite side of the roll and lapped completely over the roll and the turned up portion of the first sheet. If the lead is closely hammered down with wooden mallets no nails are required, and they are better omitted. When it is necessary to nail the lead around skylights or in other positions copper nails should always be used.

The Second Annual Convention of the Master Slate Roofers' Association of Ohio, assembled at Canton, Ohio, on the 10th inst. A number of measures for furthering the interests of the association were discussed and passed. The most important action was the changing of the name of the association. Upon motion of W. B. Lupton, of Pittsburgh, the name was changed to the National Master Slaters' Association. This has the effect of giving the present honorary members from other States all the rights and privileges of regular members. It is anticipated by those who have the enterprise in charge that it will attract a large number of new members from all over the country, especially from the States of Pennsylvania and Vermont. The following officers were elected for the ensuing year: President, D. M. Davis, Dayton, Ohio; vice-president, John Donaldson, Carrollton, Ohio; secretary and treasurer, Charles Wuichet, Dayton. The directors chosen are as follows: W. B. Lupton, Pittsburgh, Pa.; James Hunter, Cincinnati, Ohio, and Gilbert Snyder, Zanesville, Ohio. About 50 members were in attendance upon the meeting.

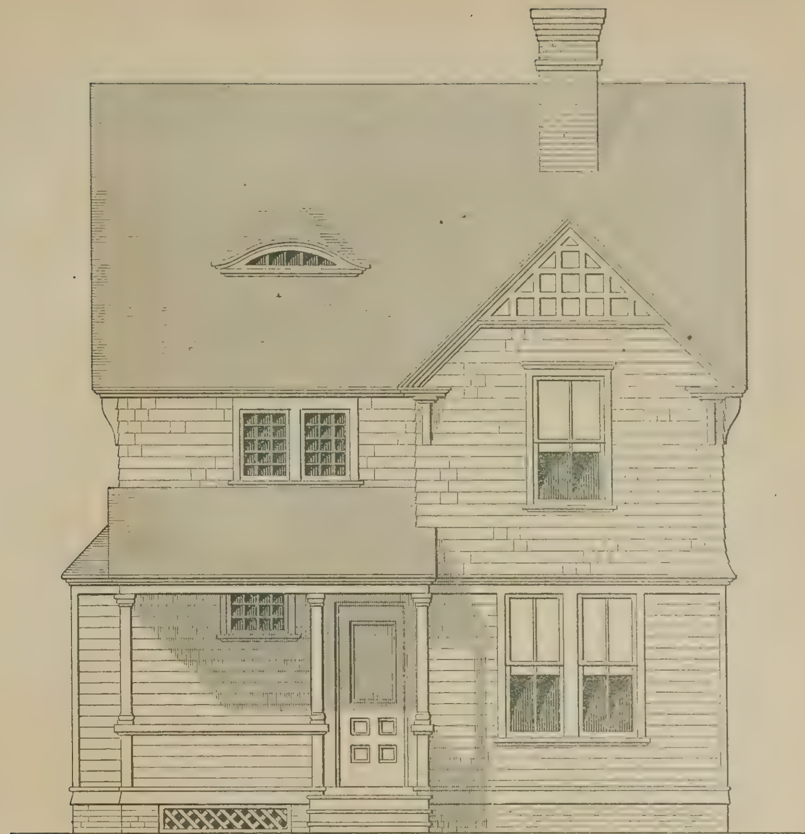
The N. U. Walker Clay Mfg. Company, corner Penn avenue and Tenth street, Pittsburgh, Pa., make a specialty of roofing material and waterproof building paper. The establishment is known as the Palisade Roofing and Building Paper Works. The circular which they have just issued illustrates and prices two and three ply roofing, and also Sackett's waterproof sheeting.



GROUND PLAN.

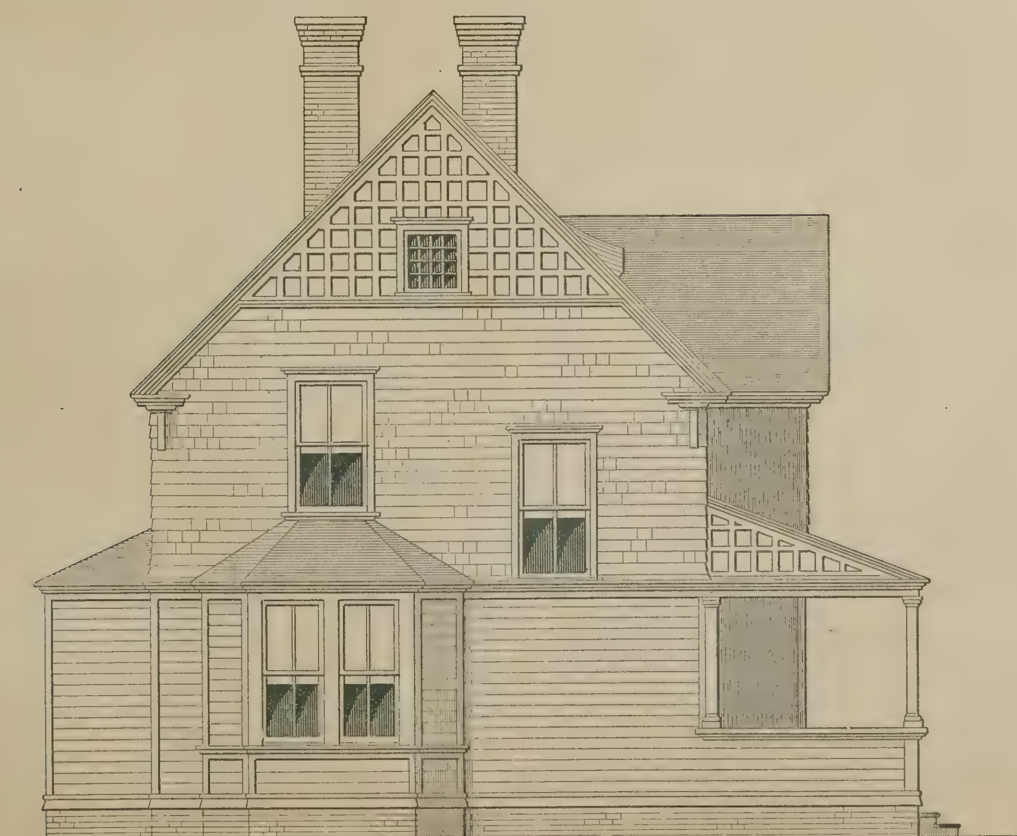


CHAMBER PLAN.

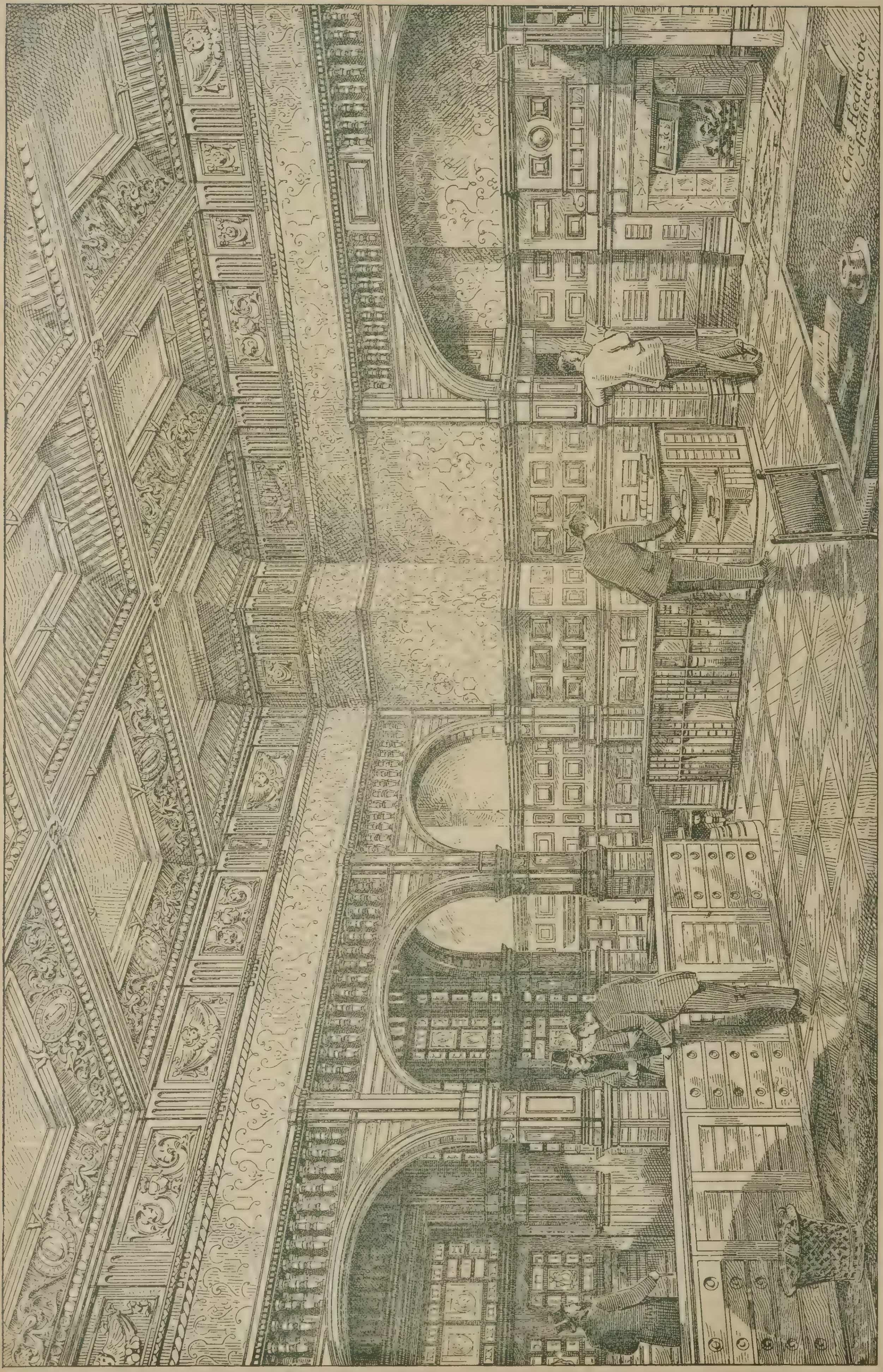


FRONT ELEVATION.

Elevations and Floor Plans of a $1600 House.

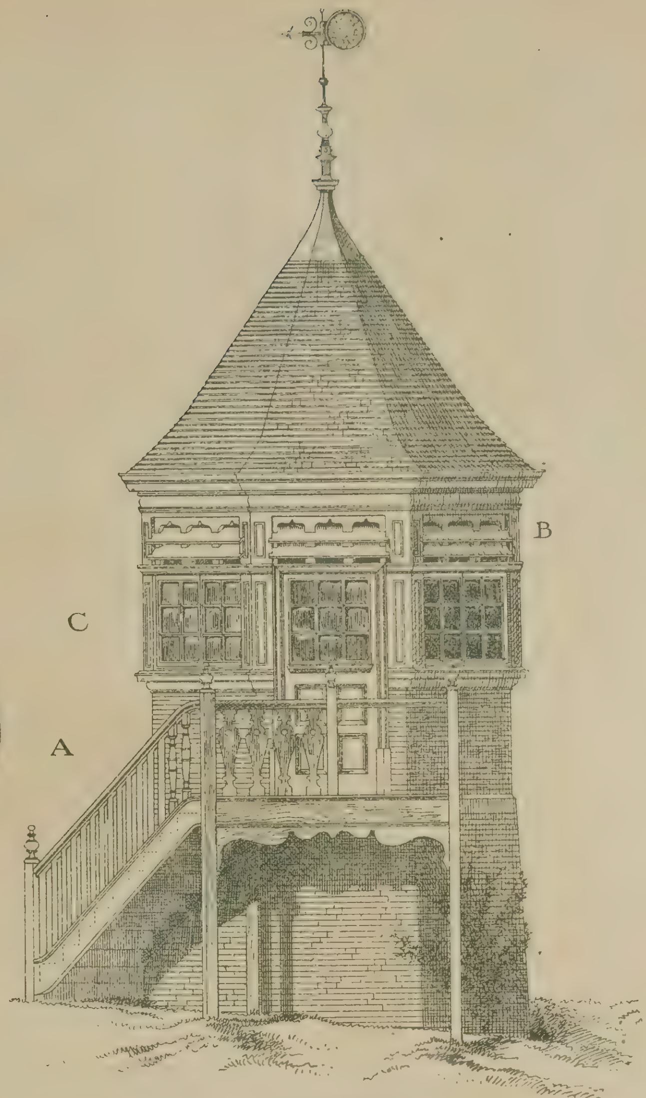


SIDE ELEVATION.

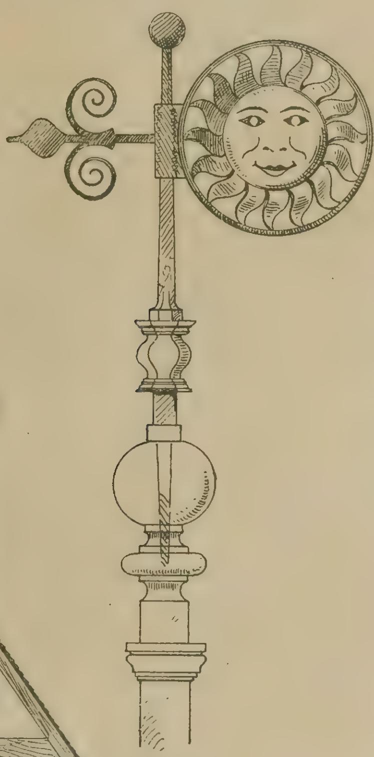


OFFICES OF COMMERCIAL UNION ASSURANCE CO., MANCHESTER, ENGLAND.

GENERAL VIEW.

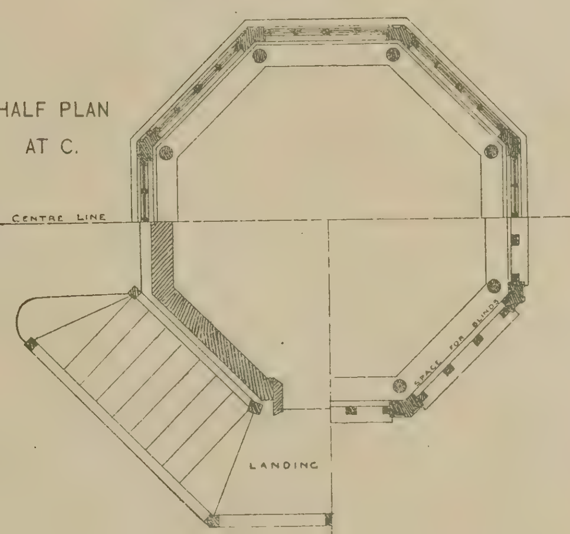


ELEVATION.

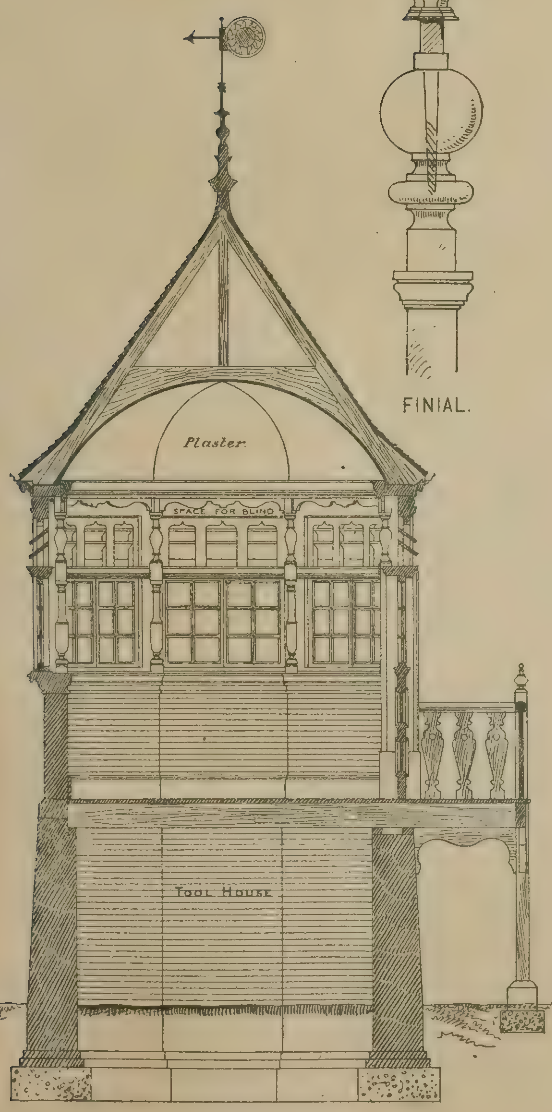


FINIAL.

HALF PLAN AT C.



PLAN AT A · PLAN AT B.

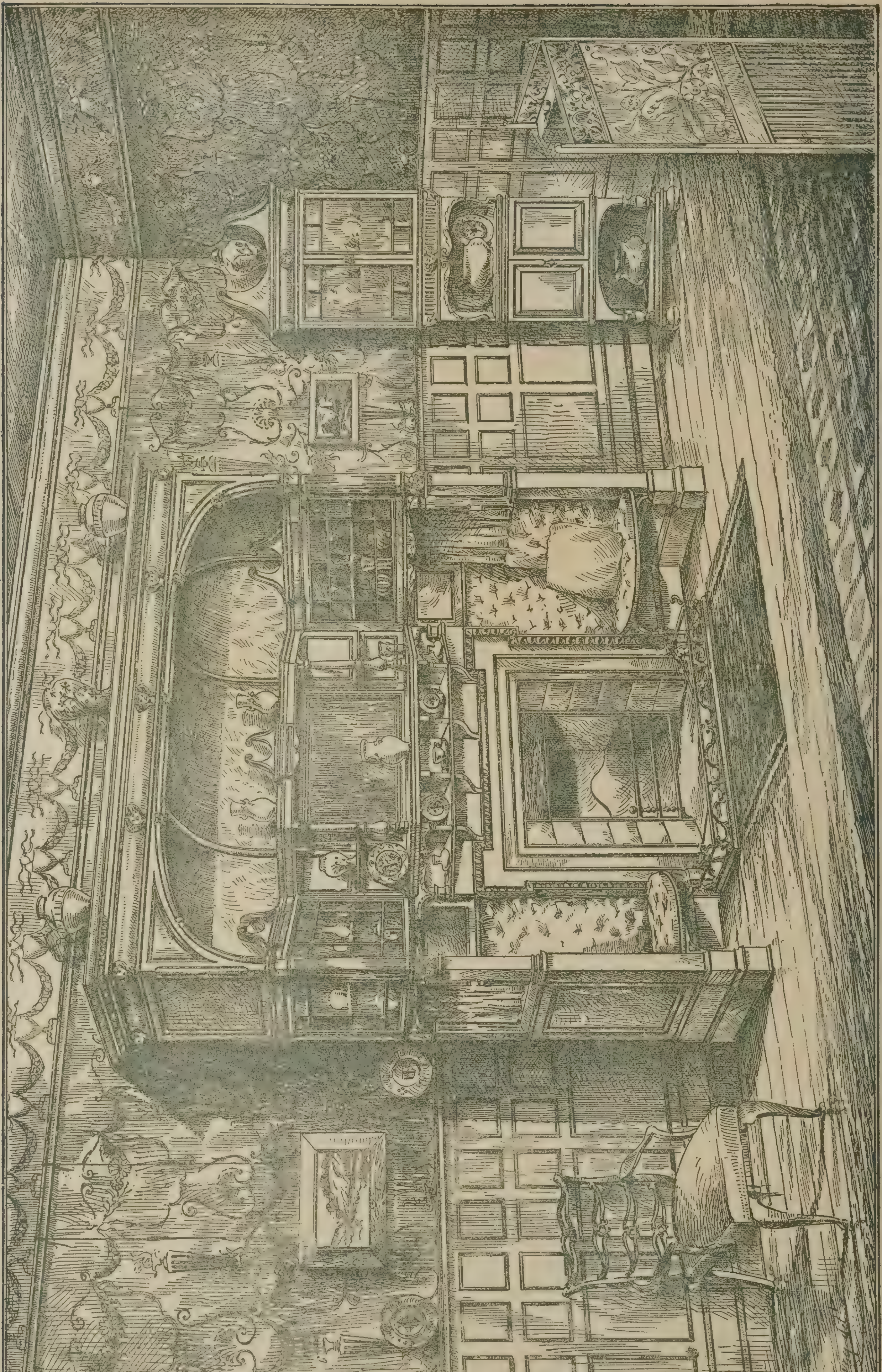


CROSS SECTION.

Design for a Garden House.

By Maurice B. Adams, Architect

SCALE OF ELEVATION, SECTION AND PLAN, 6 FEET TO THE INCH.



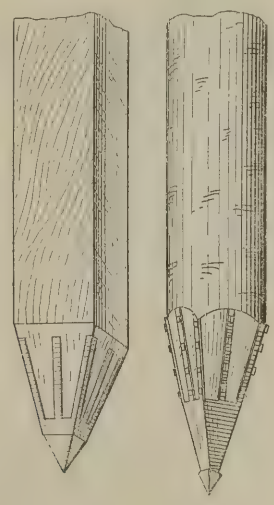
AN ATTRACTIVE CHIMNEY PIECE.—AN INGLE NOOK.

BRICKLAYING.

Brickwork and Bricklaying.

BY ARTHUR SEYMOUR JENNINGS.

The very rapid advance in brickmaking in recent years may be said to have almost revolutionized the art of building with that material. Assisted in some cases by the introduction of terra-cotta, buildings have been produced which for delicacy of molding exceed in many cases those executed in stone. The immense



Brickwork.—Fig. 1.—Wooden Piles Used in Foundations.

variety of forms in which bricks are now made places at the command of the architect means of producing effects which but a few years ago were not within his reach. Foremost among these effects if that of the variety of color available. Notwithstanding this very considerable advance, it cannot he gainsaid that from a purely constructive point of view the art of laying bricks and forming brickwork is in this country in a very unsatisfactory state. Probably this fact is to be explained to some extent by the absence of technical literature on the subject, while the unwillingness of the best mechanical element to engage in the art, perhaps in consequence of the exposure to the weather which it entails, has kept bricklaying one of the most

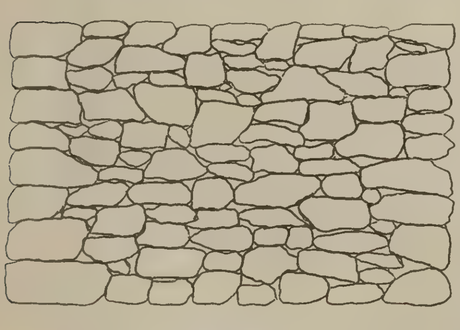


Fig. 2.—A Foundation Wall of Rubble Masonry.

backward arts of the building trades. Another reason for this very unsatisfactory state of affairs is the custom so common at present of employing face bricks of a better quality than those of the general run. A grave error in brickwork which in the United States is unfortunately almost universal is that of using what is known as "running bond." This not only leaves the wall far too dependent on the mortar for its strength, but also encourages the bricklayer in an improper mode of construction.

We purpose here considering the subject of brickwork both as to the manner in which it is the custom to carry it out, and also as to the way in which it should be executed on scientific principles.

In considering the subject of brickwork at any length it is deemed advisable to give an account of the operations of erecting a brick structure from the commencement, and we have, therefore, first to consider the very important subject of foundaations. It need be scarcely said that the foundation of any building is of paramount importance, for the stability of a structure depends wholly upon the base on which it is erected. All brick buildings settle to some extent, and nearly all foundations settle also. The form and extent of a foundation will vary with the nature of the site and the extent of the superstructure, but in all cases the object is to provide means whereby the settlement shall be uniform. As a rule there is no choice of soil, but it will be convenient to mention the different soils in their order of merit. At the head of the list comes solid rock, such as sandstone or limestone or other variety. The work upon such a site will not be considerable, for it consists chiefly of cutting the rock to a level surface or to a series of surfaces like steps to receive the walls. It need scarcely be said that foundations should always be horizontal. In building on solid rock it will sometimes be necessary to cut out rotten or defective portions and fill the same in with concrete or rubble masonry. Fissures or hollow spaces are sometimes found in rocks, and these, too, will need to be filled in in the same manner. Where the rock is soft it will be advisable to submit specimens of it to a practical test, with a view of ascertaining its crushing strength, so that the proper allowance may be made for the distribution of the weight of the walls upon it, calculations being made by which any part of the rock shall not be subjected to a greater pressure than one-eighth of its crushing strength.

Gravel, sand and strong clay may be classed together as being of good average quality, so far as foundations are concerned, and the treatment of them will depend upon how hard they are and whether they are in level beds. Where the gravel consists of firm, hard, level bed a wall may be erected upon it, but where it is softer trenches filled in with good lime or cement concrete will form foundations which will answer the purpose of distributing the load and establishing a firm base to receive the walls. The manner in which concrete is mixed and the ingredients of which it is composed were described in an article published in *Carpentry and Building* of January, 1887, and therefore the particulars may be omitted here. The advantages of gravelly soils is that they are self-draining, and buildings erected upon them are generally kept dry. Less suitable soils, such as those found in peaty or marshy districts in the immediate vicinity of water, we need not enter into at length, but a short description of the method of building upon such soils is not out of place. It may be premised that in every case as much of the soft soil should be removed as practicable and the space filled in with concrete, but it is frequently impossible to remove any great quantity, and therefore means have to be discovered to secure suitable foundations upon them. Most frequently the plan resorted to consists in

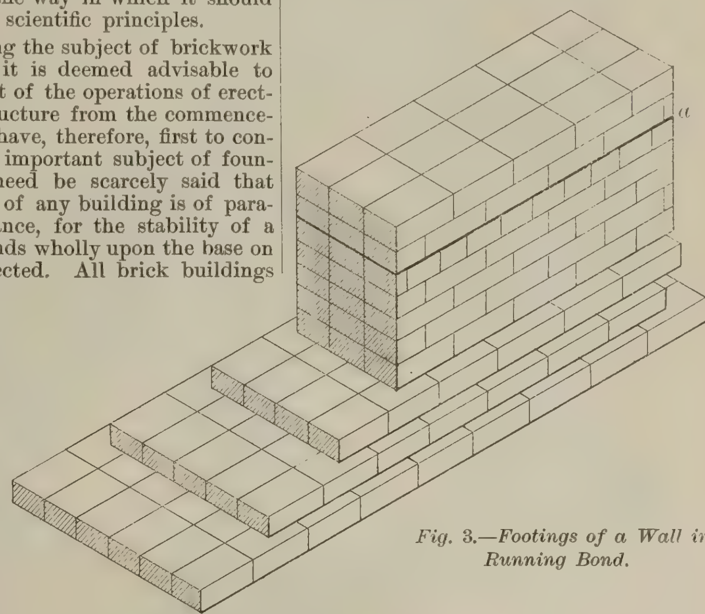


Fig. 3.—Footings of a Wall in Running Bond.

driving long sticks of wood called piles into the ground until they reach a firm basis, and upon these sticks erecting a wooden platform to receive the walls. Piles are of various forms, measuring from 10 to 15 inches diameter, and are usually driven into place by means of a heavy weight termed a monkey, which is placed between vertical guide bars and lifted, generally by steam power, to a considerable hight, and then released, so that it falls on the top of the stick of timber, driving it into the ground. The ends of the piles are shod with iron, as shown in Fig. 1, while the upper ends are provided with iron rings to prevent the blows of the monkey from splitting them. When

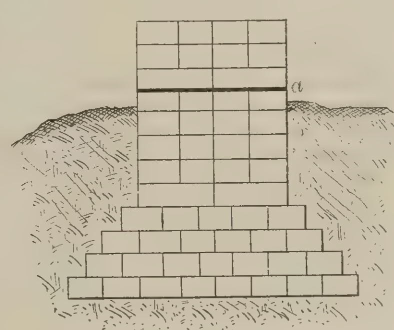


Fig. 4.—Section Through Base of a Wall, Showing Position of Damp Course.

the piles are all driven in they are sawn off level and a staging of stout timbers is erected upon them; these carry planks, which in their turn carry the walls.

Within the scope of these papers the great diversity of form of piles cannot be shown, but it may be of interest to refer to two of the types which differ materially from those already mentioned. The first of these consists of a cylindrical iron shoe, having a conical end, to which is attached a screw blade of very wide diameter. Piles of this sort are used where the soil is very soft, and they are not driven into the ground but are screwed into position, the ends being cut off level as before. It sometimes happens that a soil is found which is entirely suitable for building upon of itself, but which is underlaid by a bed of soft yielding ground. In this case the best means to insure a suitable foundation

is to drive in what are known as sheet piles, and which consist of a form very similar to the square one shown in Fig. 1, except that they are broader than wide. The method of using them is in driving them in close together, thereby forming a

Perspective View of Cottage Costing about $1400.

kind of box, which entirely incloses the site of the building and prevents the soft soil from being pressed out by the superincumbent weight.

In the term foundation is included the lowest portion of the walls themselves—namely, that part which is below the surface of the ground. In some cases this foundation is built of material which may be available, the prime requisite being that it is hard. As an example of this utilization of local material it may be mentioned that in New York City the custom largely prevails of using for the foundation walls the gneiss rock, of which the greater part of Manhattan Island is underlaid. Walls of this material are usually built by the bricklayer, and their construction, although requiring care, is to a great extent primitive in method. Gneiss rock is one which is not dissimilar to granite in appearance and properties, but it has the peculiarity of splitting easier in one direction than in the other. It is extremely hard, and having been obtained from the quarry by blasting, is set to form the wall in the following manner: The largest and squarest pieces are chosen for the sides and ends of the walls, while the smaller pieces are placed in the interior. Points and angles are roughly dressed with the hammer. On referring to Fig. 2, an idea may be had of the arrangement adopted. The stones being all of different sizes, nothing more can be done than to arrange them in such a way as to produce the best bond, and this is effected by lapping the parts so that no two vertical joints on the face come over one another. For the purpose of binding the wall together in the direction of its thickness, stones running through from one side to the other are inserted at the interval of a few feet, and, finally, the whole surface of the wall is pointed off and finished in such a manner as to produce as level a surface as can be obtained from the rough shapes available. It may be mentioned that the strength of this description of work depends not a little upon the quality of the mortar, and, accordingly, it is advisable that cement should be used in making it instead of ordinary lime. These masonry walls are built up to the level of the ground, and the main

First Floor. Second Floor.

Floor Plans.—Scale, 1-16 *Inch to the Foot.*

walls of brick or dressed stone are erected upon them.

It will be convenient at this point to describe the operations of the bricklayer in building a wall and afterward to refer to the principles upon which the work is constructed. The shape and size of the building having been determined and set down in the drawings, the excavator first digs out the site by removing the sod and surface soil. The mason then sets out straight lines with cords and pins to mark the position of the walls, the measurements being taken from the plans and careful testing being had with squares and angles to insure perfect accuracy of work. The excavators then dig out the earth to the depth required. In this work wooden staffs and levels are frequently used to test the depth, and it becomes an important part of the master mason's duty to see that the whole of the setting out is done with minute accuracy. The building then proceeds. If the foundation walls be of masonry such as has been described above, they are erected on footings of roughly squared stones. But supposing that the wall is to be of brick from its foundation up, the first proceeding is to dig trenches and to fill in concrete where the nature of the soil necessitates its use. This having been done, the footings are laid in the manner shown in the isometric view in Fig. 3. The footings consist of offsets on both

sides of the wall by which the breadth is increased at the base, with the object of distributing the weight over a large area. It will be seen that, supposing the wall to be built without footings, the whole of its weight would rest upon the soil immediately beneath it. To make this clear, let us take an example. A wall 1 foot wide and 10 feet long presses on the ground with a weight of 5 tons. It is clear that every foot beneath the wall bears a pressure of $\frac{1}{2}$ ton. Now, if—by means of footings—we increase the breadth of the wall to 2 feet, we have 5 tons distributed over an area of 20 feet, and each individual foot will support only $\frac{1}{4}$ ton. The benefit to be derived from footings in view of this fact will be obvious, especially when building on soft soils.

Immediately above the ground line should always be inserted what is known as a "damp course." This consists of a layer of some material convenient for application which is sufficiently hard to withstand considerable pressure and quite impervious to moisture. The object is to prevent the damp rising in the wall. Asphalt, sheet lead, Portland cement, and three courses of slates, laid lapping, are examples of the materials used. The position in which the damp course is built is shown, marked *a*, in Figs. 3 and 4.

(To be continued.)

Testing for Foundations.

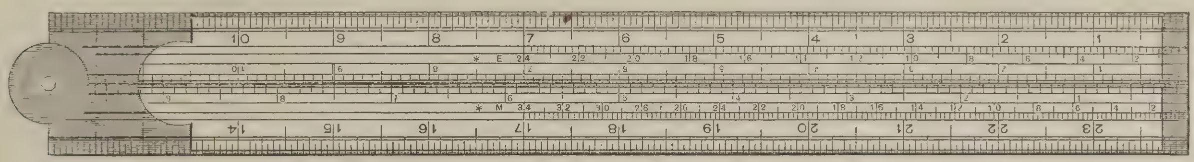
In connection with the buildings for the Paris Exhibition, a series of experiments have recently been carried out at the Champ de Mars, with a view to determine the resistance of the soil to concentrated loads, and in this way check the dimensions to be given to the foundations in different cases. A perfectly level surface in the form of a square of 118 feet side was first prepared, on which were placed four rectangular cast-iron blocks 1 foot 8 inches square, disposed so as to occupy the corners of a square, the distance apart being 11 feet 8 inches center to center, and these spaces were bridged by girders constructed of T irons. These girders were now loaded with T irons, the number and weight of which were carefully noted. At the end of 11 hours the weight on the girders had reached a total of 143,923 pounds, and indications of settlement became visible, the stress on the surface of the ground being at this moment 7.311 tons per square foot, in which is included the weight of the blocks and girders in addition to the above load. The experiment was then abandoned till the following day, when it was found that the settlement had increased during the night to an amount varying between $10\frac{1}{4}$ inches and 11 inches. The experiment was now resumed and the load increased up to 209,776 pounds, at which the experiment was abandoned, as some of the blocks had then sunk completely out of sight, leaving the girders to be supported directly on the surface of the soil. The conclusions arrived at were that the ground at this spot is capable of resisting a load equivalent to 5.43 tons per square foot, that a certain amount of settlement may be expected when the stress reaches 7.31 tons per square foot, and that it is totally incapable of bearing a load amounting to 8.14 tons per square foot.

Correspondence.

Octagonal Scales on Pocket Rules.

From H. A. M., *Mount Vernon, N. Y.*—I have a common one-joint 2-foot rule, made by the Stanley Rule and Level Company, New Britain, Conn., over which all hands in the shop are puzzled. On the inside face are two graduated spaces—one on each joint. One is marked "E" and the other "M." Will you please explain what they are used for, and greatly oblige a number of interested mechanics?

Answer.—Through the courtesy of the Stanley Rule and Level Company, whose goods are referred to above, we have a duplicate of the rule referred to by this correspondent, and from it we have made an engraving, one-half full size, which we submit herewith. The scale referred to is known as the "octagonal scale." It is found on rules of different manufacturers, and, so far as our investigations have gone, has been in greater or less use for some 30 years or more. The Stanley Rule and Level Company offer the following explanation, which we know will interest many of our readers: If it be required to make an octagon shape, for example an eight-sided post, from one that is already square, it can be quickly laid out in either of two ways by the aid of a pair of compasses or dividers and the scales referred to. This, perhaps, can be made plain by a simple illustration. Take a 2-inch square block, as shown in the accompanying diagram, place one point of the compass or dividers at the end of the rule and the other at the graduation marked 2 on the "E" scale. Set the instrument to this dimension, and then, with one leg placed successively at each corner of the block, prick points along the edge. This will be correct for the lines for cutting eight-squares or octagonal forms. Referring to the diagram which is presented herewith and which has been made 2 inches square, the dividers are set as above described, and then, measuring successively from A, B, C and D, points are laid out as indicated by *a* and *d*, *b* and *c*, &c. Inasmuch as the rule here engraved is one-half full size, it will be necessary to take double the space in the dividers in case the reader wants to test the accuracy of the diagram or to experiment on his own account. If he has a rule which has the scale upon it, then, in turn, he will not need to refer to the engraving above mentioned, but can follow the letter of the instructions above given. The same results can be accomplished by setting the dividers in a similar manner, taking the space indicated by 2 on the "M" scale. In passing we should remark that "E" of the scales refers to edge measurements and "M" to center or middle measurements. Before using the latter scale it is necessary to draw center lines through the block, as indicated by E F and G H of the diagram. Then, with the dividers set, as already explained, measure successively from the points E, G, H and F, as shown by *a* and *b*, *c* and *d*, &c. As will be gained by inspection of the engraving of the rule, the "E" scale will serve for dimensions of squares up to 24 inches and the "M" scale for all squares up to 34 inches. If an 8-sided post is to be worked out of one that is round, or that is irregular in shape, the best plan, of course, is the method last described—namely, that of drawing center lines and using the "M" scale. The "M" scale is also useful where the corners of the timber are broken away, preventing the use of the "E" scale.



Two-Fold 2-Foot Rule, Half Size, Illustrating Octagon Scales.

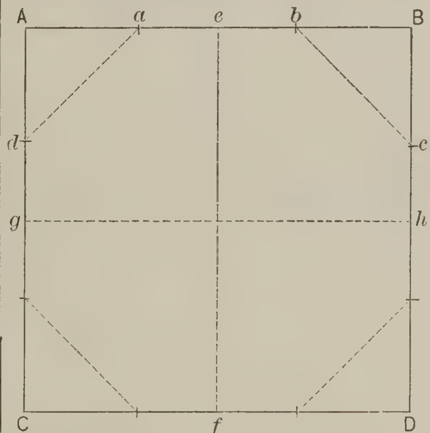


Diagram Illustrating Application of Scales E and M.

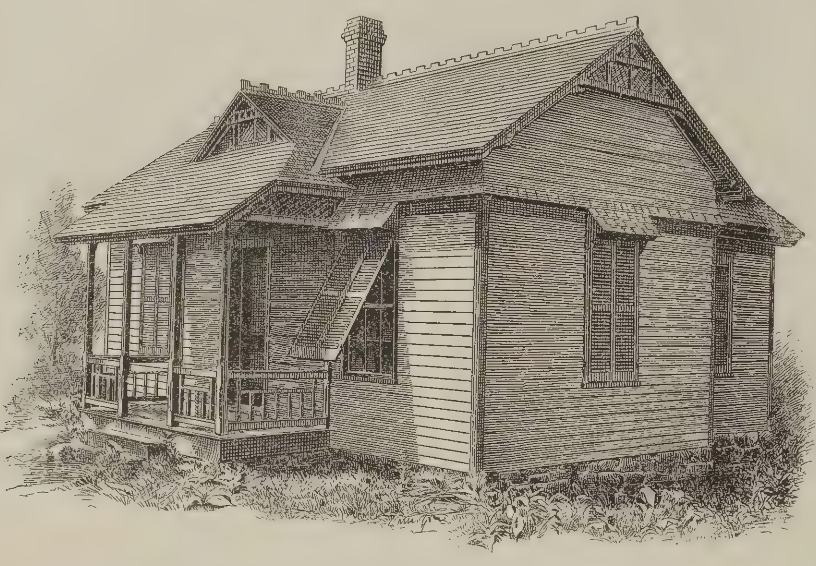
Apprentices.

From W., *Salina, Kan.*—In the April number of *Carpentry and Building*, under the head "Learning a Trade," is a letter from Mayor Hewitt, in which he says, "Under the regulations adopted by various trades unions, the number of apprentices is limited, so that there are a large number of young men growing up in our midst who are unable to gain access to any mechanical employment." The limiting of the number of apprentices was forced on the trades unions by the employers, who, when the unions were organizing, some 30 years ago, endeavored to break them up by taking on large numbers of apprentices who, when they had become journeymen, would have to give place to still other apprentices at the same low wages. The aim of trades unions in general, and the Brotherhood of Carpenters and Joiners in particular, is to compel the adoption of a strict apprenticeship system, so that when one learns a trade he will not have to compete for work with the unskilled, ignorant, low-priced botch. A bit of actual experience is to the point. A few years ago a young man, 25 years old, married, sober and intelligent, was, on account of ill health, the result of a sedentary occupation, compelled to follow some active vocation, and chose carpentry. The result of an extensive correspondence and personal application in several cities was the invariable answer, "It does not pay to take apprentices," and this in face of the fact that there were no organizations of carpenters in these cities whatever. As a consequence the young man had to pick up the trade as best he could. The abolition of the apprenticeship system was due to the employers alone, and its revival will be owing to the trades unions

entirely, and whenever the employers recognize their usefulness and utility, and cease endeavoring to reduce wages by overloading the market for journeymen, then, and only then, will the rules regulating the number of apprentices be repealed. "F. N. C.'s" article in same number on "jerry" building in Kansas is true, except as to wages. The number of carpenters in this State who get more than $2.50 per day is so small as to make the rate unquotable, while the average in the whole State is less, if anything, than $2. There are fair mechanics working in this city now for $1.25 to $1.50 per day, and there are many who cannot get work at any price, while living expenses are from 10 to 25 per cent. higher than in the East.

Wildwood Cottage.

From Louis Miller, Arcadia, Mo.—I inclose a photograph and ground plan of a three-room cottage which I built a short time since at a cost of about $400 complete. I call it Wildwood Cottage, and submit it to the readers of *Carpentry and Building*, because it would seem to have some interest for them.



Wildwood Cottage.—From Photograph Supplied by Mr. L. Miller.

Note.—We present herewith engravings made from the photograph and plan inclosed by our correspondent. He has succeeded in securing a very compact, neat and well-arranged cottage, which will no doubt prove of interest to many of our readers.

Inside Sheeting.

From J. S. Y., *Mount Union, Ohio.*—I quite agree with "S. F. B.," of Wellington, Ohio, with reference to inside sheeting. I think the right way is to put the sheeting on the outside. The boards should be planed and matched, then covered with building paper; next, nailed over a plastering lath on the studding, so as to form a space between the finish and the sheeting, which will give the work a chance to dry out. Besides, the air space adds to the general warmth of the house.

REFERRED TO OUR READERS.

Thickness of Brick Walls.

From B. G. J.—Will some practical readers of *Carpentry and Building* present the rules which govern them in determining the thickness of brick walls for stores and buildings over one story in hight? Also the rules which control the thickness of foundation walls and the footing for the same? I would like to see this subject discussed by practical builders.

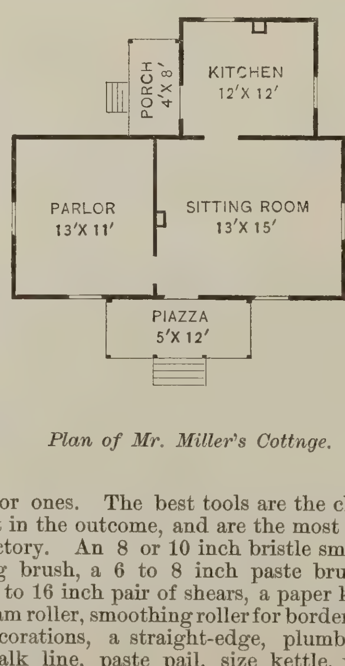
Coloring a Violin.

From A. B., *Winnipeg, Canada.*—I desire to inquire of some of the practical readers of *Carpentry and Building* what kind of stain is used in coloring a violin. I have just made an instrument of this kind for my own use, and desire to finish it in the best manner. Any help that the practical readers of the paper can give me will be very acceptable.

Practical Paper Hanging.

The following directions for paper hanging, which appeared in a recent issue of the *Painter's Magazine*, will be appreciated by those of our readers who have recently addressed us inquiries concerning this subject:

The primary essential to commence a job of paper hanging is to have the tools. Any "Jack" can work with a full set of tools, but it takes a good mechanic to work with poor ones. The best tools are the cheapest in the outcome, and are the most satisfactory. An 8 or 10 inch bristle smoothing brush, a 6 to 8 inch paste brush, a 14 to 16 inch pair of shears, a paper knife, seam roller, smoothing roller for borders and decorations, a straight-edge, plumb-bob, chalk line, paste pail, size kettle, paper boards, trestles and step ladder. These are the necessary tools for general work, though it is necessary, to save time and trouble, to have besides these tools a good-sized kalsomine brush and a double-width putty knife. The next we need to proceed with is a bucket of paste. Use flour paste, except on very rare occasions when the tints are very delicate. The best patent flour is the most adhesive, and retains its consistency much better than starch. Take a common patent pail and put in one-half gallon of flour. Stir in enough cold water to mix a flour batter; work out all the lumps thoroughly, have ready three gallons of absolutely boiling water, and stir this in until you have enough to cook it. Now pour a little cold water over the top to prevent skinning over until you are ready to use it. You can thin it down at pleasure. If the paper put on is not a metallic ground, put in four or five ounces of alum in the paste. This will prevent its turning sour and hasten drying. Should the paper be metallic use a little carbolic acid in place of alum, as alum is liable to turn gilt dark. If the room you are to paper is a hard finish and not very badly smoked up all that is necessary to prepare the walls is to brush them with a broom. Should they be smoked and dirty it is best to go over them with a weak solution of glue and alum. If the walls have been papered before it is necessary to go over them again with a putty knife and cut the old paper off; pull out all nails, and with some plaster of Paris mixed with paste heal all the bad places. If the walls have been whitewashed, doctor them with a strong solution of vinegar. Having the walls ready, lay a roll of paper on the boards and with your straight-edge, which should be 6 feet long, measure the hight to where the border will come and about an inch below the base-boards, and cut the strips off. Match the next strip to the top of the previous one and cut enough strips to cover the room.



Plan of Mr. Miller's Cottnge.

To ascertain the number of strips required, take a roll of paper and count the number around the room. Now turn the paper over if you have trimmed it; put the trimmed edges toward you and pull the first over, so that it covers the other strips. This is to prevent the paste from forming on the trimmed edge and making bad work. Some paper hangers never trim the paper till after it is pasted. This procedure has some good features and some bad ones, which we will not discuss here. Beginners will find it better to have the paper trimmed beforehand. Commence at one end of the room and hang the strips as nearly perpendicular as you can. Always brush the paper from the center down and at either side. If you have wrinkles in the paper, pull it off to where the wrinkle is and brush out from the center. Run the shears along the paper at the top of base-boards, and cut off nice and even. Never allow the paper to look haggled or uneven around the base, and cut it close down but not overlapping.

When you come to an opening let the paper overlap, and with the paper knife cut out the surplus. Use the paper knife as you work a saw. You will next need short strips, but not run them beyond the opening unless the piece cut out of the other side will fill up the opposite; rather lap back again to be sure of a perfect match. When you come to a corner never lap the paper around it unless the space is very narrow. Fold up the strip at both ends, measure the distance with your ruled shears, lay the straight-edge on the paper, mark the distance just a little beyond the corner and cut. In this manner you will always have corners that will be square and stay in position. Use the same roller and roll down the seams nicely as you go. Cut the border in such lengths as can be easily reached to put on, paste and double up at both ends, so that the lines meet exactly, and cut.

Masonry.

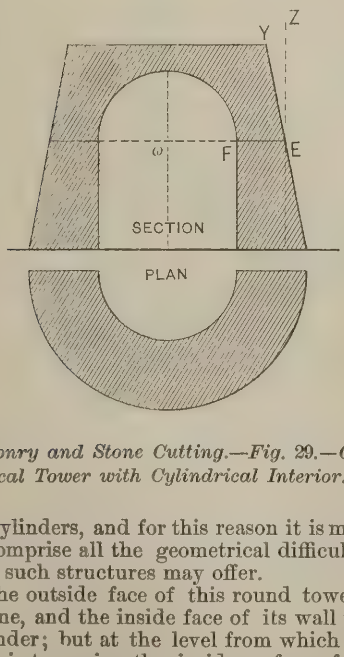
Masonry and Stone Cutting.

(Continued from page 79, April.)

The lower bed is worked in the same way with the help of the arc L G P, see plan, drawn on the plane G′ L′, see elevation, and with the help of the intersection of the outside operation plane or face r' s' of the prism by the conical surface of the bed prolonged. The molds of the upper and lower beds, which are developments of cones, serve to delineate the interior arris of the upper bed and the exterior arris of the lower bed. Marking datum points we have now the necessary elements for working the spherical surfaces of the extrados and the intrados of the voussoir with the help of the proper templets cut according to the main sections of these surfaces.

There is another method which is specially applicable to cupolas of large dimensions, where necessarily the curvature of the surface of each voussoir is but slightly felt. If, Fig. 25, we prolong the line L′ M′ until it touch the meridian of the cupola in the points w and u, the line w u will be equal to the diameter of the circular section of the cupola by the plane L′ M′. If we draw that circular section on the face of a stone, Fig. 24, we can hollow the place within it by means of a templet, which will give us the surface of the cupola. The difference between this spherical surface and a plane being very slight, we place thereon a cardboard mold, $\lambda'\mu'v''\pi''$ Fig. 22, representing the soffit of the voussoir considered as part of a cone, the apex S′ of which is above the cupola. This gives us the outlines of the soffit of the voussoir; we then work the joints and beds with the help of a bevel, Fig. 26, one branch of which is cut according to the curve of the cupola, while the other branch is straight and normal to the said curve. Mathematical exactness can be obtained by marking on the circumference of the hollowed circle the position of the four angles L_2 M_2 N_2 P_2, Fig. 28, of the voussoir's soffit; then, with two templets, Fig. 27, cut to the curve of each parallel, we can draw the arrises M_2 N_2 and L_2 P_2 of the upper and lower beds, and, with a templet cut to the curve of the meridian of the sphere, we can draw the arrises of the vertical joints M_2 L_2 and N_2 P_2.

This problem is proposed as an exercise in the intersections of cones and spheres

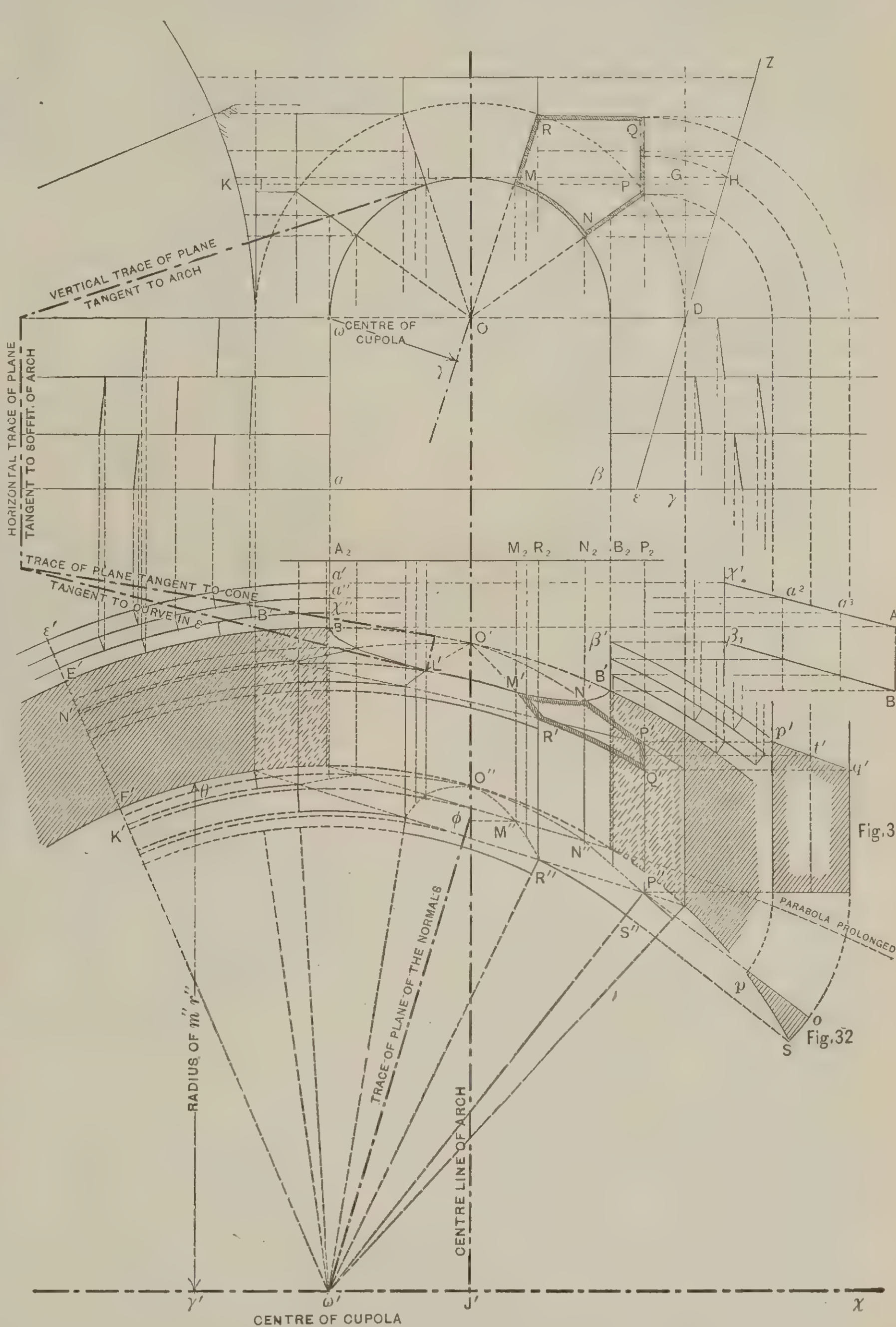


Masonry and Stone Cutting.—Fig. 29.—Conical Tower with Cylindrical Interior.

by cylinders, and for this reason it is made to comprise all the geometrical difficulties that such structures may offer.

The outside face of this round tower is a cone, and the inside face of its wall is a cylinder; but at the level from which the arch is to spring the inside surface of the tower is finished with a hemisphere. In Fig. 29 we give a section of the proposed tower. The angle Y E Z gives the batter of the wall. The springing of the cupola and of the arch to be constructed is at the level of the line ω F E.

In our working drawing, Fig. 30, we make our elevation on a plane perpendicular to the center line of the arch, and we take our plan at the level of the springing line of the arch. On the plan the projection of the vertical axis of the cupola falls on the point ω′, and the dotted line



Figs. 30, 31 and 32.—Working Drawings.

O O′ O″ shows the direction of the center line or axis of the arch. The reader will observe that the center line of the arch does not meet the vertical axis of the cupola, and for this reason the arch is defined as oblique. Usually the center lines of arches are made to pass through the centers of the cupolas, and the intersections and arches of the cupolas form plain circles. From the center ω′, with the radii ω′ E′ and ω′ F′, we draw the outside and the inside lines of the circular wall at the level of our plan. On the right hand of the elevation we delineate in Z D the outside batter of the wall.

We draw the elevation of the archway as usual. If we consider the voussoir marked M N P Q R on the elevation we see that it will be a prism of which the pentagon M N P Q R is the base; the prism is limited at one end by a portion of the cone which forms the outside surface of the tower, whereas at the other end it is terminated by the spherical surface of the cupola. To get the full projections of this voussoir we have only therefore to delineate the intersections of the prism with the above surfaces—viz., with a cone and a sphere.

If we produce a horizontal plane at the level of the arris M of the voussoir it will cut the cone (which forms the outside surface of the wall) along a circle of smaller radius than ω′ E′. Its radius will be equal to W′ E′—G H measured on the right-hand side of the elevation. The point M′, where this circle meets the horizontal projection of the arris M, will be a point of the plan of the exterior opening of the arch. Repeating this operation for the arrises of all the voussoirs, we can delineate on plan the complete outline of the arch. The dotted extrados or back of the arch is found by the same method.

In this structure the arris of the bed-joint M R is not a straight line, but a conic section. On plan it will form a curve, M′ R,′ the prolongation of which will pass in O′, where the axis of the arch cuts the surface of the outside cone. The same

observation is equally applicable to every other bed-joint, such as N P.

The horizontal joint R Q cuts the cone along an arc of a circle R′ Q′ (see plan) easy to find. The vertical joint P Q will cut the cone along an hyperbola shown in its real form on the mold (Fig. 31) or auxiliary elevation of that joint; but in Fig. 30 the arris of that joint is projected both on plan and elevation as a straight line.

The intersection of the arch with the spherical surface of the cupola is found by the same method of sections by horizontal planes. (It may be interesting to know that the projection on plan of this intersection is the arc of a parabola, the principal diameter of which is the line $\omega' x$, and the apex of which is situated on the right-hand side of ω'.) The section of the sphere at the level of the arris M will be a circle of radius equal to ω' F′—I K, the dimension I K being found on the left-hand side of our elevation, where we have delineated the section of the sphere.

The same method will also help us to find the projection on plan of the intersection R″ M″ O″ of the plane of the bed joint M R with the surface of the sphere; its real shape is an arc of a circle, but its projection on plan is a portion of an ellipsis. The same method applies to the other bed-joint P N.

The intersection of the sphere and the horizontal joint R Q is, of course, an arc of a circle with its center in ω'. The vertical joint P Q would also intersect the sphere along an arc of a circle; but, as it would form a sharp angle with the surface of the sphere, the vertical joint is stoped in P″, and is finished by a small surface P″ S″, forming part of a meridian plane of a sphere. The mold for this surface is given in Fig. 32; its side $p\ s$ is an arc of the meridian of the sphere, $q\ s$ = P″ S″, $p\ q$ = P Q, hight of the vertical joint taken on the elevation.

For the mold of the vertical joint (Fig. 31) the outside hyperbola $p'\ t'\ q'$ is drawn with the help of a few points taken at different levels.

For the stones of the wall below the springing of the archway we begin by drawing the horizontal beds on the elevation, and, with the help of the section on the right-hand side of the elevation, we can find the radius of the outer arris of each bed on plan. For instance, the radius of the bed at the level of $\alpha\ \beta$ will be equal to ω' E′ + $\varepsilon\ \gamma$ (see section). The vertical joints are struck on plan from the center ω' of the tower, and are then carried on the elevation. We have given on the right-hand side of the plan the molds α_1 A_1 and β_1 B_1 of the outlines of the door jambs; they are, of course, hyperbolæ.

Tangents.—The tangent to the plan of the arch head on the outside face of the wall in any point L′ is the intersection of the planes relatively tangent to the cylindrical soffit of the arch, and the conical surface of the tower in the point L. The way to draw this tangent is shown on the left-hand side of Fig. 30. The same method could also be used for finding tangents to the curve of penetration in the sphere; but the normals to the sphere and the cylinder are so easily drawn that it will be much easier to make the tangent perpendicular to the trace of the normals. The foot of all the normals to the sphere is ω' center of the sphere, and ϕ on the axis of the arch is the foot of the normal to soffit of the arch in the point M″; $\omega'\ \phi$ is, therefore, the trace of the plane of the normals.

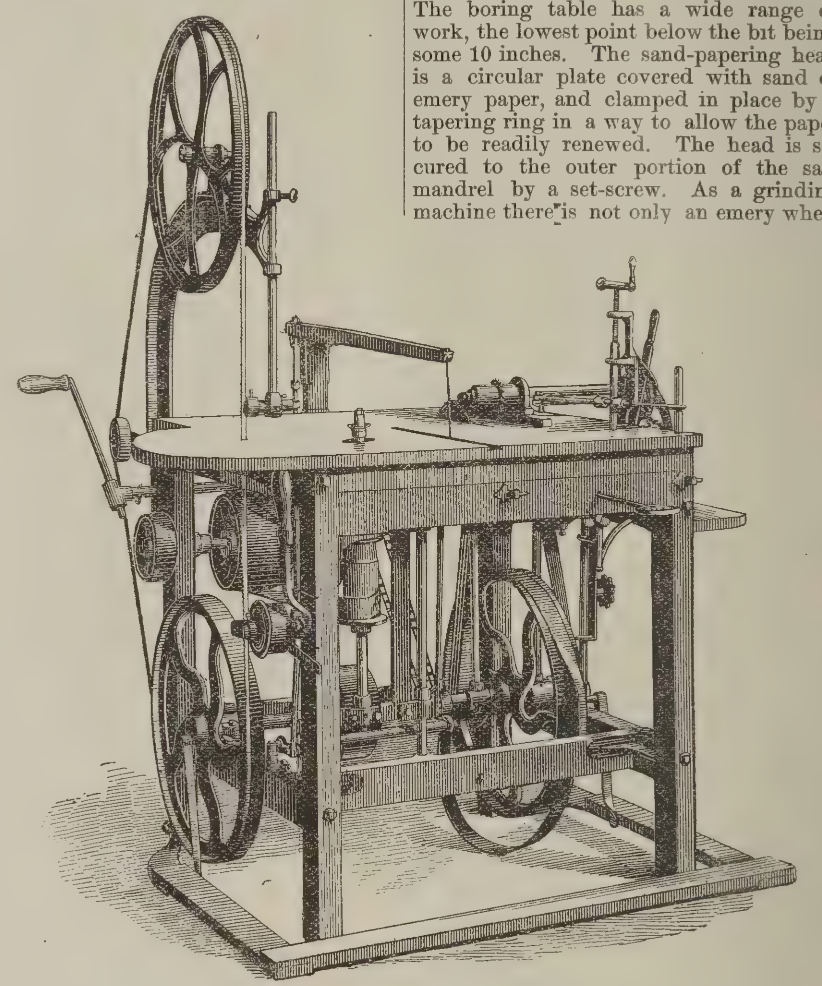
(To be continued.)

PROFESSOR TORREY, of the Assay Office, in this city, advocates the construction of a new building, preferably near the Battery, which could be used jointly for the appraiser's stores, custom-house, sub-treasury and assay office.

NOVELTIES.

Combination Sawing Machine.

Fig. 1 of the engravings represents a new combined sawing machine introduced by Snedeker & Voorhees, Jamesburg, N. J. The machine is designed for a large variety of work, is operated by foot or hand-power, according to circumstances, and is of a kind to be of special interest to managers of small shops where steam-power and high-priced machinery are out of the question. There is provided in one machine a self-fed rip saw, a cross-cut saw, rabbet and miter sawing, band and jig sawing, variety molding, boring, sand papering and emery grinding, all combined in the one device. We have referred to foot or hand power, but it will be readily perceived that steam-power also may be used, if desired. Notwithstanding the fact that the device is a combined machine, the makers point out that it is so arranged that each part can be operated entirely independent of the others, and can be changed in a moment to any branch of its work. It is claimed for this device that in capacity and range of work it exceeds all other machines of its class. The saw mandrel is hinged to the main shaft, so that for rabbeting the saw can be run to any needed distance below the table. It is secured in place by a thumb nut, thus determining the depth of rabbet without raising the table. As a cut-off saw, instead of sliding the gauge and work to the saw, the saw is drawn to the work and passes below the table when not in use. As a band-saw, the capacity is 10 inches in thickness if desired. The distance from the plate to the inside of the goose-neck is 26 inches. Top and bottom saw guides are provided. The jig saw operates upon a new principle, and is without guides, gauges or working parts to be clogged or broken by chips or sawdust. It is claimed for it that it will start or stop instantly without the operator stopping the machine. The upper arm is arranged so that it may be removed out of the way of the other parts when it is not required for use. The former or molder runs in either direction to suit the grain of the wood, and carries the same size head as is used on power machines. A vertical adjustment of 4 inches above table is provided, and it is so arranged as to pass below the table when not in use. The boring table has a wide range of work, the lowest point below the bit being some 10 inches. The sand-papering head is a circular plate covered with sand or emery paper, and clamped in place by a tapering ring in a way to allow the paper to be readily renewed. The head is secured to the outer portion of the saw mandrel by a set-screw. As a grinding machine there is not only an emery wheel in place for use, but a rest on which to support the tools or saws while being ground. The treadle extends on three sides of the machine, so that the operator can use it from any position in which he may stand. Hand-power is secured by two adjustable handles, a shaft being connected to the main shaft by a sprocket chain, thus securing a positive motion. The total weight of the device is upward of 500 pounds.

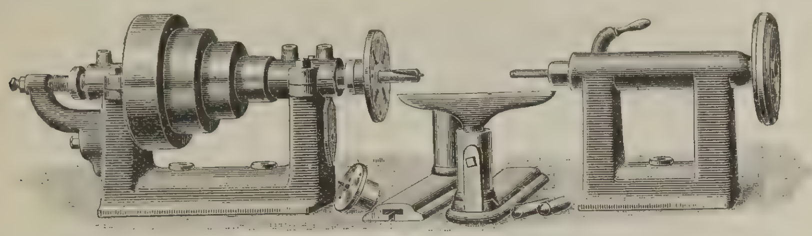


Novelties.—Fig. 1.—Combination Sawing, Molding and Boring Machine. Built by Snedeker & Voorhees, Jamesburg, N. J.

Pa Crusta.

Pa Crusta is the name which has been adopted for a new mural and ceiling decoration that has been brought to public notice by the McDonnell-Mallen decorative Company, of Jacksonville, Ill. It is a rival of lincrusta walton and *papier maché* in its decorative effects, but is vastly different in its preparation and application, as well as its low cost. As far as it is possible to ascertain the new process consists in the application to a suitably prepared wall or ceiling of ordinary brown wrapping paper, moistened with a paste which causes it to adhere to the plaster and at the same time enables it to be molded into various designs by the hand. No molds are employed for the production

of set figures and patterns, but, on the contrary, an irregular appearance is intentionally sought by the originators of this method of decoration. After the ground work has thus been prepared it is painted in bronze, silver, or any other style of finish that may be desired. The ticket office of the



Novelties.—Fig. 2.—Improved Pattern Maker's Lathe. Built by Frank H. Clement, Rochester, N. Y.

Michigan Central Railroad, at the corner of Clark and Randolph streets, Chicago, is the first instance of the application of this method of decoration on a proper scale accessible to the public. In order to show its capabilities several styles of treatment have been here introduced, but without by any means exhausting the

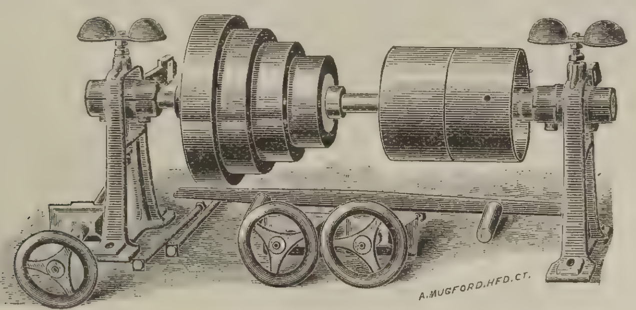


Fig. 3.—Countershaft and Attachments for Lathe.

range, as other combinations continually suggest themselves to the artistic workman. It seems in a high degree unconventional, bold and striking in its originality. Those interested in the process claim that the application of this method of decoration is very simple, so that talented and therefore high-priced workmen are not absolutely essential to its successful

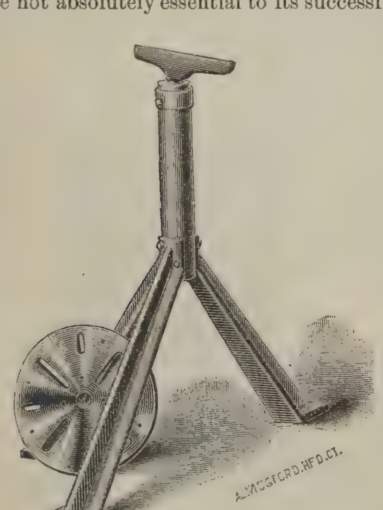


Fig. 4. Heavy Floor Rest Stand Supplied with Lathe.

arrangement. It is also very easily repaired if it is accidentally chipped, which is quite a favorable recommendation. It is the intention of the company to confine their work to dwelling houses and offices, avoiding saloons. In this way they claim a larger patronage will be assured among those who desire to see their houses look differently from drinking resorts.

New Pattern Maker's Lathes.

Frank H. Clement, 131 Mill street, Rochester, N. Y., has just produced, from new designs, a line of improved pattern maker's lathes which embody many advantages not usually found in such tools. One of these lathes is shown in Fig. 2 of the engravings, while Fig. 3 shows the countershaft and its attachments, together with rests and other parts belonging to the tool. The countershaft is designed for going above the lathe, but has been engraved as it would ordinarily stand upon the floor previous to shipping; consequently it is represented upside down. Fig. 4 shows a heavy floor rest stand, which is supplied with the lathe. The head and foot stocks are cored hollow and made heavy and rigid, so as to resist vibration or chatter. The head and tail spindles and all centers are of steel. The tail-screw has square threads and the hand-wheel is turned and polished. The main bearing caps are planed into ledges on the head stock and lined with fine babbitt, which is carefully scraped and the journals nicely fitted, so as not to heat when started. All surfaces restings on the bed are planed true and do not require fitting down if the bed is true. The headstock cone is of iron, specially strengthened inside, but quite light. The maker informs us that it can be reversed, when ordered, to bring the large lift next the head center. The countershaft has a kiln-dried cherry cone, glued up in layers, with grain crossed. It is fastened at both ends to the shaft. The main arbor extends at both ends, with reverse threads as usual. There is provided a detachable yoke to take the end thrust, which is furnished with a bronze step and a hardened steel center pin, and a large face plate for the overhanging end of the arbor is supplied.

New Clapboard and Siding Gauge.

Figs. 5 and 6 of the engravings contain two views of a new siding or clapboard gauge, which is being introduced by the Stanley Rule and Level Company, 29 Chambers street, New York, and New Britain, Conn. Fig. 6 shows the tool in use and readily suggests the method of application and also indicates the adjustments provided. Beneath the handle there is a flat plate, on the upper edge of which are provided two prongs, thin at the extreme edges, adapted to be slid up between the boards of two courses. When the wooden handle, by which the gauge is held, is straight with the gauge, there is nothing to interfere with these two flat prongs extending upward, as we have described, nor yet to prevent them from being readily withdrawn. The handle, however, serves a double purpose. It is

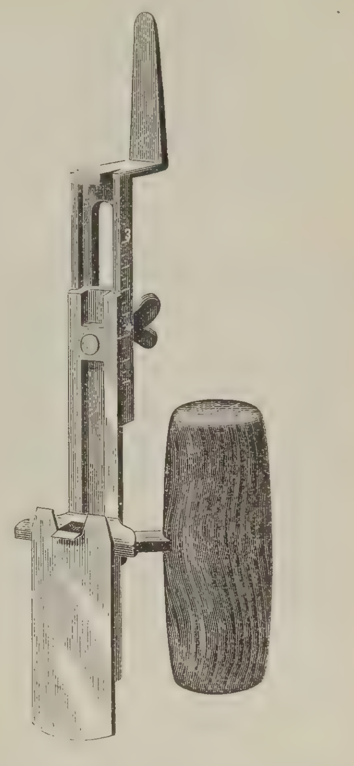


Fig. 5.—Stanley's Clapboard and Siding Gauge (Back View).

provided with a cam, the effect of which, when the handle is turned either to the right or left, is to push a stud, operating between the two prongs above described, into the wood. This stud is shown projected in Fig. 5 of the engravings; accordingly the gauge is instantly fastened in place by simply turning the handle to either side as above mentioned. The hole made in the wood by the stud is smaller than a nail hole and is at a point that causes it to be readily stopped up by paint. The gauge is adjustable, as will be seen in both engravings. A graduated scale is provided and the two sections are held together by a wing nut. The bayonet-shaped portion at the top forms a rest for the clapboard that is to be put in place. This is one of the simplest and most effective tools for the purpose that we have seen, and we risk nothing in predicting a large demand for it. The makers recommend a full set, or three gauges, for ordinary work.

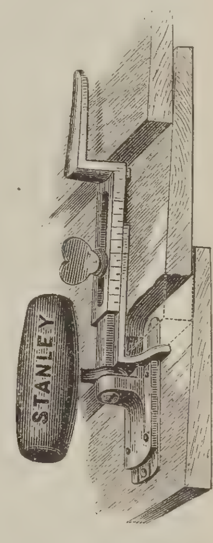
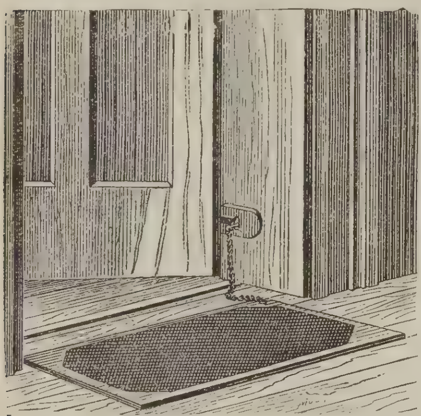


Fig. 6.—Clapboard and Siding Gauge in Use.

Mat Fastener.

In all the large cities householders are more or less annoyed by sneak thieves carrying off their door mats. Not long since we heard of a case where two enterprising mat thieves drove through a street in one of the large cities and gathering mats right and left from the doorways of residences, carried them away in broad

daylight by the wagon load. Where it happened that they were interrupted for any reason their excuse was ready and plausible. They were commissioned to clean the mats. The depredations of door-mat thieves leads householders to devise means of guarding against loss in this direction. Accordingly, it is not unusual to find mats chained in place or otherwise secured. Henry Lefort, 60 Arlington street, Newark, N. J., appreciating the demand for a simple and effective mat fastener, has brought out what is shown in the accompanying engravings. The larger cut shows the mat attached in place and indicates how the fastener is



Novelties.—Fig. 7.—The Perfection Door-Mat Fastener in Use.

locked and also released by the swinging of the door. The smaller of the two cuts shows the details of the device. It consists of a plate held against the door-jamb by a screw. Into a notch or slot in the plate the special attachment shown at the end of the chain is inserted. When the door is shut the chain is secured in place; when the door is opened the fastening is released and the chain may be removed. The other view in the cut of details shows the connection for the mat. This consists of a wire staple extending through a plate, which is adapted to be inserted in the mat.

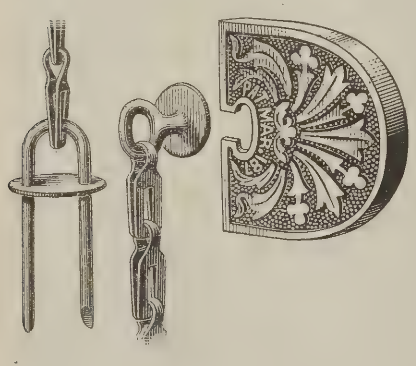


Fig. 8.—Details of Door-Mat Fastener.

The prongs of the staple are turned either way or clinched, thus firmly attaching the chain to the mat. The maker points out that the device is simple, ornamental in its general features, easily applied and safer than a lock and key.

Mineral Wool.

The application of mineral wool can scarcely be considered a novelty at the present time, and yet its use is not thoroughly understood by many of our readers. The Western Mineral Wool Company, with office at Cleveland, Ohio, and St. Louis, Mo., have recently issued a very neat pamphlet, entitled "The Uses of Mineral Wool in Architecture, Car Building and Steam Engineering." Among the engravings contained in this pamphlet is one representing the floor and side walls of a room in a residence, showing the mineral wool in the floor and also in the walls behind wire lath. The engraving is a much happier presentation of mechanical details of this sort than is frequently encountered, and we have thought that it

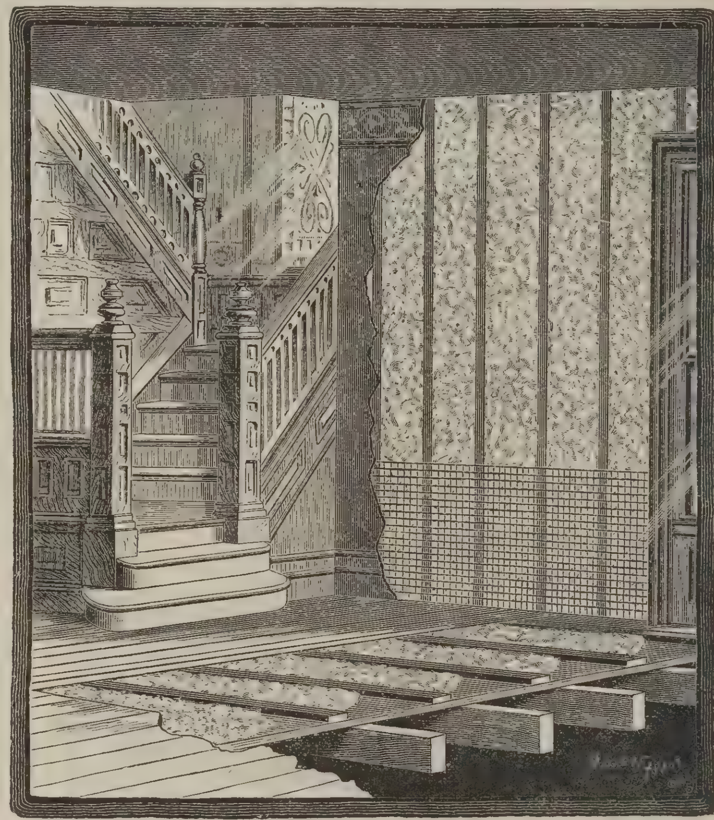


Fig. 9.—The Application of Mineral Wool to Walls and Floors in a Residence.

possessed enough of interest to warrant our including it in this department of the paper. It is shown in Fig. 9. The pamphlet referred to discusses mineral wool in a very comprehensive manner. After telling what it is, there is presented a very careful statement of its properties, following which is a similar chapter devoted to its uses. Its application in packing-houses, refrigerating-houses, breweries, tanneries, schoolhouses and other public buildings, hotels, business blocks and dwellings, is carefully described. The third chapter is devoted to the application of the material in still other ways, and carefully describes how it is to be used to accomplish the best results. Directions are given for estimating and for making calculations of quantities. Several illustrations are presented showing the use of mineral wool in the construction of railway coaches. Other engravings show how it is to be used in covering pipes for the conveyance of steam and hot water. At the conclusion of the pamphlet numerous testimonials are presented, indicating the results of its use. The pamphlet throughout is of interest to a large class among our readers.

Combined Air and Water Heater.

We present in the accompanying illustration a broken view of the Mahony Combination Air and Water Heater, which is being put on the market by M. Mahony, Troy, N. Y. The combined heater, as shown in the cut, consists of a cast-iron boiler, within a steel plate furnace. The whole is inclosed in a double casing, the inner casing being of common, and the outer of galvanized iron. The lower section of the boiler forms the fire-pot of the furnace, while the upper section is in the midst of the flame and exposed to the direct radiant heat of the fire as well. Before the flame and hot gases can escape to the chimney they must pass down the revertible flues in front, and thence around the fire-pot to the smoke flue at the rear, this arrangement, it is said, exposing every square inch of the boiler to the heat. It is further mentioned that, as the flame is also in contact with the steel drum which incloses the boiler, a large amount of air is warmed and sent to the rooms above, thus saving a considerable amount of heat which would otherwise be lost. Each section of the boiler is cast in one piece, the two sections being connected by wrought-iron pipes having right and left threads, so that there is not a packed or bolted joint in the boiler. Re-

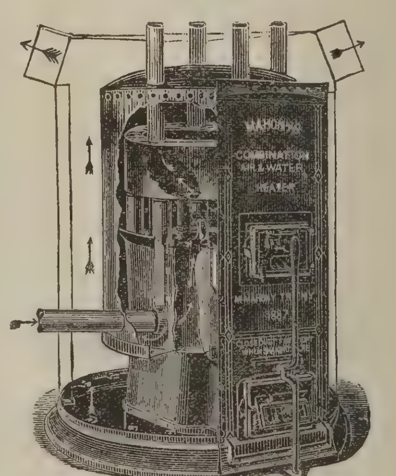


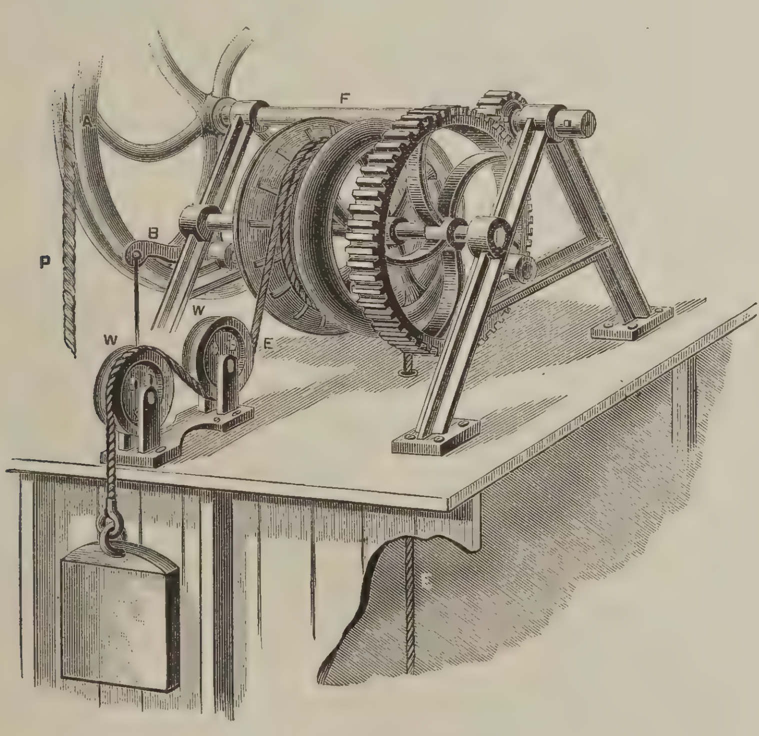
Fig. 10.—The Mahony Combined Air and Water Heater.

ferring to the illustration, it will be noticed that the water enters through a pipe near the bottom of the boiler, and as it becomes heated is carried off from pipes above. The air supply enters from below the base of the furnace, and, becoming heated in rising, is carried off from the large pipes shown above. In offering this

heater to the trade, Mr. Mahony directs attention to the advantages of combining the warm-air furnace with a hot-water heater. The advantage of the former is that it supplies a liberal quantity of fresh air to the rooms heated, while the use of the hot-water coils makes it possible to heat the distant rooms without any danger of interference by high winds. The combination heater is said to be especially adapted to warming residences, the usual practice being to heat the halls and rooms on the first floor by hot air and the remainder of the building by direct radiation from coils. The reason given for using hot water instead of steam is that the temperatures of both the water and the air are regulated by the fire, while, if steam were used, it would require a strong fire to make the steam, which would be inconvenient in mild weather. It is further claimed that hot water requires less fuel than steam. The combination heater is made in three sizes, adapted to heating from 35,000 to 100,000 cubic feet of air.

The Humphrey Pony Hand Elevator.

This elevator, which is represented in the illustration given below, is manufactured by the Edward Storm Spring Company, Poughkeepsie, N. Y. It is intended for light store and factory work and other uses which are met by its capacity of 300 to 500 pounds. The illustration represents the construction of this elevator and the fixtures, which are furnished by the company. A is the hoist wheel; P the hoist rope; B the brake lever; F the ribbed drum-wheel, around which the lift-rope E is wound once; W W show the two small friction wheels and the manner in which the lift-rope E goes over and under them to the weight box. The weight can be adjusted to run down on either the right or left hand side as desired, and the fixtures are supplied either way as required. When not specified, they are furnished with the weight to run on the right-hand side as one faces the front. A weight is attached to the bottom of the brake rope, and, as will be readily understood, raising or pulling on this rope releases or applies the brake. For hoist rope $\frac{3}{4}$-inch manila is used, and for lifting rope either $\frac{3}{4}$-inch manila or $\frac{1}{2}$-inch wire tiller rope, the latter being preferable. The circular of the company relating to this elevator illustrates fully its use, and explains in detail the brake attachment, to the efficiency of which they call attention. The low price of this elevator, permitting it to be used in many places instead of the dumb waiter, and its simplicity of construction, are points which are made in regard to it.



Novelties.—Fig. 11.—The Humphrey Pony Hand Elevator.

Improved Wood Door Knobs.

J. Bardsley, 59 Elm street, New York, is putting upon the market a line of wood

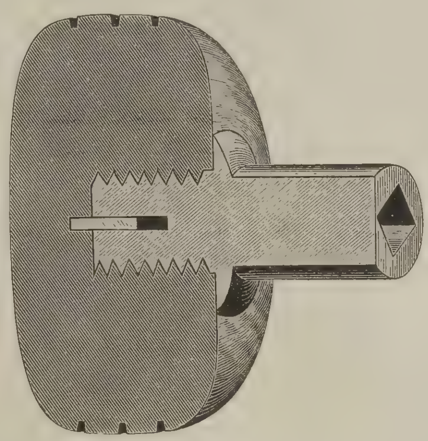


Fig. 12.—Improved Wood Door Knob.

door knobs, the constructive features of which are illustrated by the accompanying sectional view. The cut illustrates the patent method of fastening the shank to the head of the knob. It will be seen that the shank is provided with a thread and is screwed into place in the usual manner. This done, a small metal key is forced into the wood through the aperture of the shank. This securely locks the parts together. The construction is such that the maker feels safe in warranting the goods fully. The advantages of this device will be appreciated by our practical readers.

Stuart's Door Screen Frame and Corner Iron.

E. C. Stearns & Co., Syracuse, N. Y., are putting on the market a new screen door frame, which is used in connection with a new corner iron, the special feat-

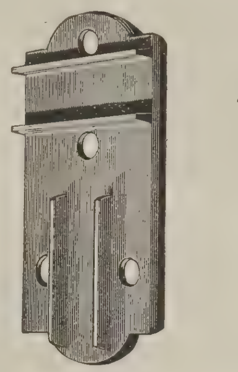


Fig. 13.—Stuart's Patent Corner Iron.

ures of both of which are shown in the accompanying illustrations, Fig. 13 showing the corner iron separate, and Fig. 14 representing it applied to the frame and indicating the manner in which it is attached to it. It will be seen from Fig. 13 that the corner iron is provided with parallel tongues which, as the screws are tightened, enter firmly into the grooves in the wood, at the same time squaring the corners of the door and preventing any sagging or settling. It has a lacquered surface of the tasty design shown, and, together with the blued screws which are used in fastening, makes a tasty addition to the appearance of the door. Each set contains six corner irons and a knob or

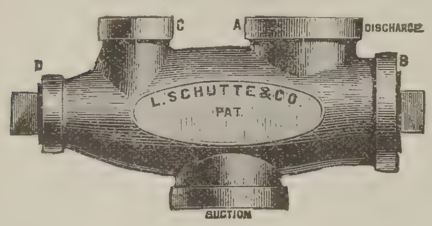
Fig. 14.—Stuart's Screen Door Frame and Corner Iron.

handle put up in a neat paper box, with the necessary screws. The special features of the door frame are shown in Fig. 14, and it is obvious that it can be put together very quickly, no carpenter work being necessary, all that is requisite being to saw the sticks to the proper length and then attach the corner irons. The frames are described as made of carefully selected wood, and finished with a rich black walnut stain. They are furnished $\frac{7}{8}$ x 2 inches

and $\frac{7}{8}$ x $2\frac{1}{2}$ inches for doors 3 x 7 feet, and $3\frac{1}{2}$ x 8 feet. A sufficient number of corner rons are packed with each case of door frames. The manufacturers emphasize the advantage this door has over others in the fact that it is adjustable, avoiding the necessity of carrying a great variety of sizes in stock.

Automatic Cellar Drainer.

The accompanying cuts illustrate the cellar drainer or water ejector, operated by water pressure, which is being put



Novelties.—Fig. 15.—Automatic Cellar Drainer.

on the market by A. Aller, 109 Liberty street, New York. The device is intended for lifting and removing water from damp cellars, vaults and foundation pits, engine-wheel pits and other places where water accumulates through defective surface drainage, occasional floods or high tides. It has already been successfully used for some little time, and we understand it has received the approval of the Boards of Health of New York and Brooklyn. Fig. 15 illustrates the general appearance of the drainer. The left hand upper and side connections are for pressure water, either one being used, as may be more convenient, while the similar openings on the right-

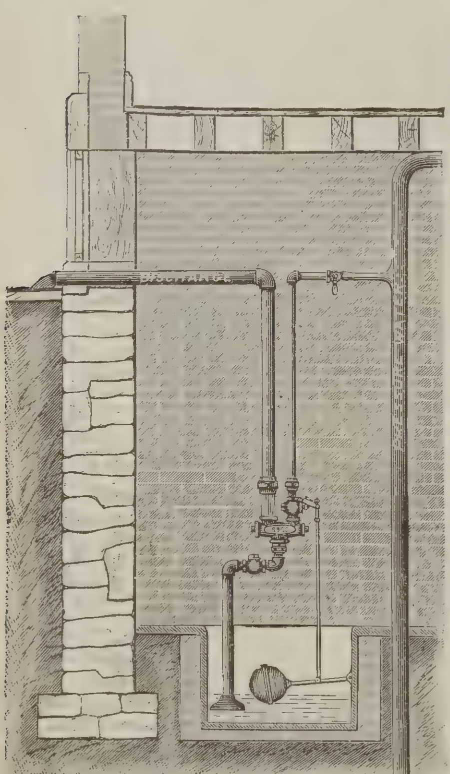


Fig. 16.—Cellar Drainer Suspended Above the Water and Fitted with Automatic Valve Controlled by Float.

hand side are for attaching the discharge-pipe. The water to be drained is drawn up through the suction-pipe, which is connected at the bottom of the device. In Fig. 16 the drainer is shown in position with a float attachment for working it automatically. Its operation is simple, for when in position the rising of the water will lift the float which opens the valve, when the pressure water will discharge the contents from cellar or pit. When this is done the float falls and the water from the main is shut off. A suction-valve is provided at the bottom of the device, which effectually prevents any pressure water from getting into the cellar in case of insufficient pressure from the main. In Fig. 17 the same device is shown without the automatic attachment. When so placed the water from the main is turned on by means of a hand valve and when the pit or celler is emptied is shut off again by the same means. The hight to which water can be elevated depends upon the

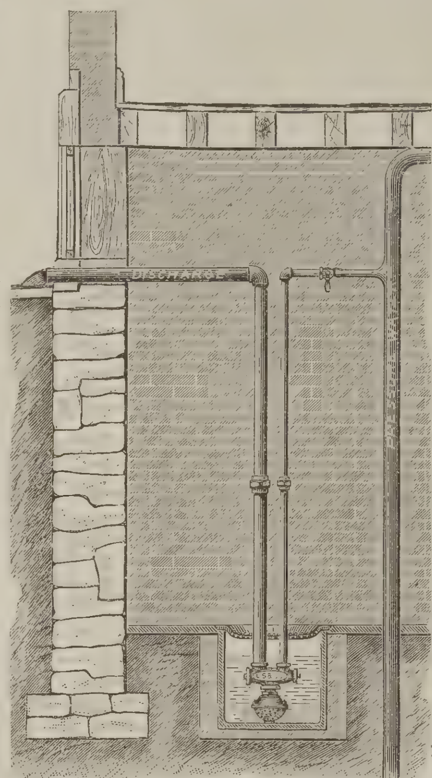


Fig. 17.—Cellar Drainer Immersed in Water Without Automatic Attachment and Operated by Opening Water Valve in Supply Pipe.

pressure available. Where it is not required to lift the water over 3 feet a hydrant pressure of 15 pounds is sufficient; but if the discharge must be made at greater hight it is neeessary to allow 5 pounds additional pressure for each extra foot elevation. About 3 gallons of water from the main is consumed in discharging 2 gallons of cellar water, which proportion shows the supply required in operating the device. This drainer can be had in sizes from $\frac{3}{4}$-inch to 2-inch discharge-pipe.

The Rodgers Sash Cord or Chain Fastener.

This article is manufactured by the Nimick & Brittan Mfg. Company, Pittsburgh, Pa., and, as indicated by its name and shown in the accompanying cut, is a device for attaching cord or chain to window sash. The cut represents it full size inserted in the sash and holding the cord. It consists of a simple iron frame having a cam by which the cord is held. This cam can obviously be placed in such a position that the cord is easily inserted, and when the cord is drawn upward it is held rigidly in place. To remove the cord or chain from the fastener a piece of wire about 12 inches long, as shown in the cut, is pushed down between the back of groove and the cord and pressed firmly on the top of the cam and the cord easily drawn out. When this device is intended for use with chain instead of cord a different

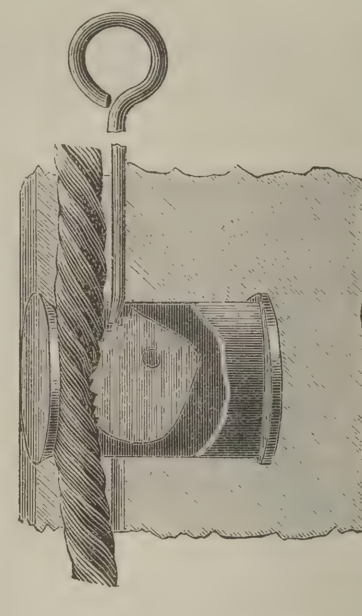


Fig. 18.—The Rodgers Sash Cord or Chain Fastener.

cam is used. The simplicity of this fastener, the fact that there are no springs or complex parts to break or get out of order, and the economy of time and labor in its use, are points to which the manufacturers call attention.

Clark's Double-Cut Countersink.

The illustrations herewith given represent a tool manufactured by the Syracuse Twist Drill Company, of Syracuse, N. Y., for whom H. H. & C. L. Munger, 142 Lake

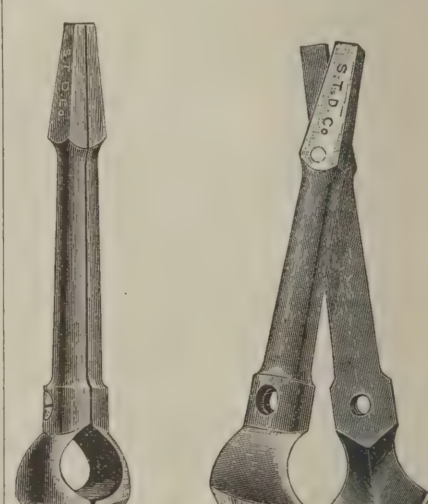


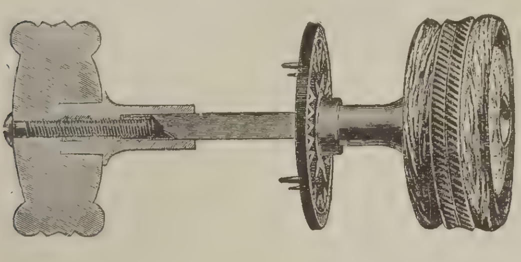
Fig. 19.—Clark's Patent Double-Cut Countersink.

street, Chicago, are Western agents, A. Flagler & Co., 72 Reade street, being the New York agents. This tool is made in two parts, pivoted in the shank and held by a screw in such position as to present two cutting edges to the work. By simply turning out the screw opportunity is presented for sharpening. Ample space is allowed for the passage of chips inside the

countersink and their escape. The illustrations show the countersink closed for work, and also with the parts separated for sharpening, A special merit of this countersink is that it can be sharpened without decreasing the diameter of the cutter, and its smooth work is also alluded to. It is put up in neat pasteboard boxes containing a half-dozen.

Expanding Spindle Door Knobs.

The Hollenbeck Lock and Knob Company, of Syracuse, N. Y., are directing attention to the form of expanding spindle door knobs which they are putting on the market. The accompanying engravings so clearly show the construction of the knob in question that it will be understood with very brief description. A split spindle is used in combination with a hollow shank and a screw entering through the center of the knob. By this means perfect adjustment to different thicknesses of doors without washers or lost motion or the use of small screws is obtained. Wear is taken up by simply re-adjusting the screw. The split spindle on entering the shank comes in contact with a tapering wedge on the inside of the shank. The screw entering through the knob locks the shank and the spindle firmly together, making it rigid and secure. The parts are quickly combined, and when once properly adjusted are always in order.



Novelties.—Fig. 20.—Hollenbeck's Expanding Spindle Door Knobs.

Fig. 21.—The Spindle.

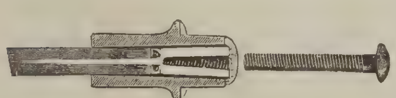


Fig. 22.—Spindle, Shank and Screw.

Surface Ornamenting Machine.

A surface ornamenting machine, with radial arbor, is being put upon the market by J. A. Fay & Co., of Cincinnati. The machine is designed for producing all kinds of surface ornamentation in a quick and rapid manner. As will be noticed by reference to Fig. 23 of the engravings, the frame is made in a single piece of columnar form with a projecting neck, which has on its extreme end an opening in which is fitted a cylindrical sleeve bearing, which carries the carving spindle. By unloosening the thumb-screws on top the arbor can be radially moved in any direction. The driving pulley is placed on the arbor in the center of the sleeve bearing, and is belted directly on the countershaft placed above. As furnished by the manufacturers it is supplied with one long carving spindle with six cutters; also with four tracing tools. The cutter will be understood by reference to Fig. 24, where the tracing tools are also shown. In Fig. 25 are shown samples of the work produced by this machine, and almost any kind of surface ornamenting can be done with the aid of this device. The cylindrical sleeves can be changed to work upon the opposite side, or the machine can be suspended from above on a frame.

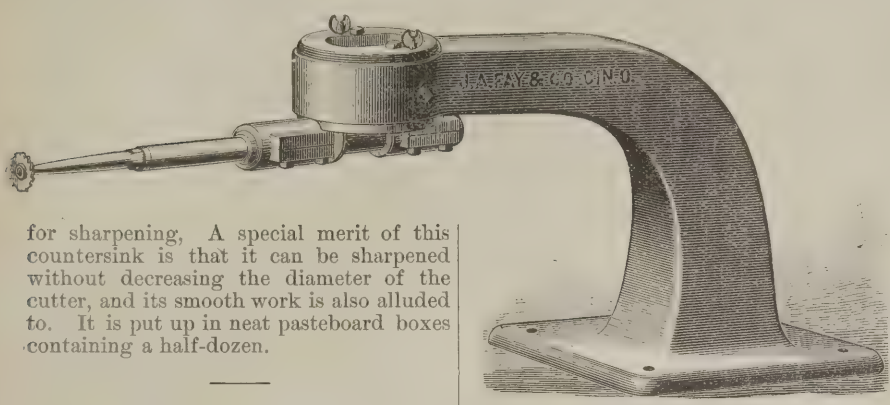


Fig. 23.—Surface Ornamenting Machine, Built by J. A. Fay & Co., Cincinnati.

Universal Bevel Protractor.

L. S. Starrett, Athol, Mass., is putting on the market the bevel protractor illustrated in the cut shown in Fig. 26. The blade of this tool is 7 inches by ½ inch, the stock 4 inches long, and both are made from sheet steel nicely finished. The disk, as shown in the illustration, is graduated in degrees from 0 to 90 each way, and rotates the entire circle on a central stud inside the case. The blade, which is clamped by an eccentric stud against the edge of the disk, may be slipped back and forth to its full length, or turned at any angle around the circle and firmly clamped at any point, adapting it for work in positions where others cannot be used, and rendering, it is said, the common universal bevel for transferring angles unnecessary.

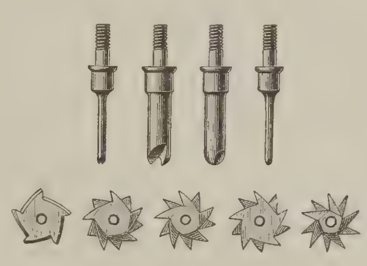


Fig. 24.—Cutters and Tracing Tools.

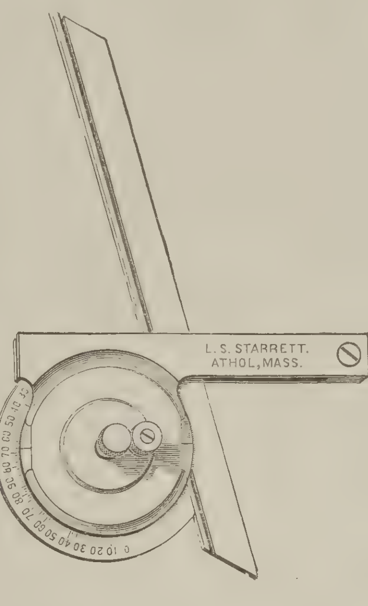


Fig. 26.—Universal Bevel Protractor.

One side of the stock is made flat, making it a convenient tool for laying on paper in drafting, &c. The special utility of this tool is referred to by the manufacturers as particularly adapting it to the requirements of the trade.

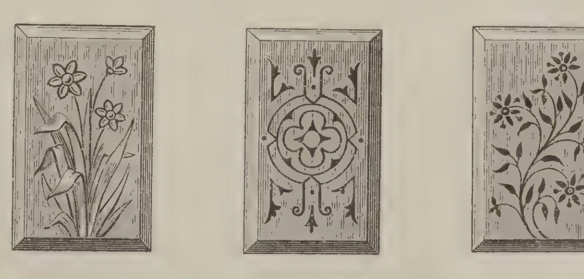


Fig. 25.—Specimens of Surface Ornamentation.

NEW PUBLICATIONS.

TURNING LATHES. Edited by James Lukin. Size 5 x 8 inches, 158 pages. Price, $1.

We have just received from the Britannia Works, at Colchester, England, the above book on turning lathes, which, when its character is once known, will be gladly welcomed by all amateur turners. Mr. Lukin, in preparing the work, started out without pre-supposing any knowledge of lathes or tools on the part of the reader, and everything is therefore explained in detail, with the necessary illustrations and in the most elementary manner. Beginning with a description of a plain foot lathe, the book takes up, in succession, the several details connected with it, the use of turning tools, and the turning of hard woods. Metal turning with hand tools is then considered, and is followed by slide-rest work in metal, until finally the reader is introduced to the self-acting lathe. Various forms of this tool are illustrated and described, the mysteries of screw cutting and turning square sections are explained, and various practical hints are given to the amateur. Short chapters then follow on the choice of a lathe, the grinding and setting of tools, metal spinning and the ornamental drill and eccentric cutter. Both these last are

disposed of very briefly. The concluding chapter gives illustrations and a description of a milling device fitted for lathe use. The treatment of the subject throughout is simple and easily understood by even the most non-technical reader, and to him, particularly, the book cannot fail to prove interesting and valuable.

HANDBOOK FOR ENGINEERS, ARCHITECTS AND OTHER WORKERS IN IRON AND STEEL. By J. C. Bland. Published by the Pottsville Iron and Steel Company, Pottsville, Pa.

Mr. J. C. Bland has compiled for the Pottsville Iron and Steel Company a series of tables on the capacity of the wrought iron and steel beams, iron and steel channels with explanatory chapters on determining their capacity and the use of the tables printed. The latter give for different spans, the safe load in net tons, the deflexion in inches, the distance apart in feet from center to center for safe loads in multiples of 25 pounds per square foot between 100 and 250 feet. A chapter is added on concentrated loading and on a method proposed by Mr. Bland of computing the absolute maximum bending moment on stringers due to the passage across them of a series of concentrated moving loads. A method of making computations for plate girders is followed by two examples carefully worked out, one for a single webbed and the other for a double webbed girder. In a similar way a chapter is worked out on buckled plates, on trussed girders, flitch beams and girders formed of beams. Tables are presented on the strength of hollow wrought and cast-iron columns, on the strength of square pine posts, followed by a mass of miscellaneous information; like tables on the carrying capacity of seasoned white pine beams; the shearing and bearing values of rivets; the bearing values and movements of resistance of pins; the weight of bar iron, flats, plates, rivets, bolts and nuts, machine bolts, sheet iron and steel, cast-iron pipe, welded tubes, spikes, timber, &c. The last series are a number of tables of weights compiled from various sources. The book is very handsomely equipped; is illustrated with plates of sections and views of the works of the Pottsville Iron and Steel Company, and is bound in Russia leather in the style usually adopted for engineers' pocket books of reference.

THE MANUAL TRAINING SCHOOL. Comprising a full statement of its aim, methods and results, with drawings of shop exercises in wood and metals. By C. M. Woodward. 366 pages; 144 engravings. Bound in cloth. Published by D. C. Heath & Co.

The author of this volume has been prominent as a promoter of the new system of industrial education, both as a writer and as a teacher. The volume before us, accordingly, can scarcely fail to be an acceptable contribution to the general literature of manual training. The work is subdivided into four general parts. The first is a historical introduction; the second is an exposition of the methods and scope of the school; the third the results of manual training as shown by the records and testimony of graduates and others, and the fourth a discussion of the educational, social and economical bearings of manual training from various standpoints and at various times. Mr. Woodward's connection with the manual training school of Washington University, St. Louis, Mo., naturally leads him to refer to that institution in the course of his illustrations. The book is one that is of great interest throughout, not only to those who are considering the subject of industrial education, but also to those who are attempting to educate their own boys without the assistance of an institution. The illustrations presented show a course in woodwork, &c., that will be suggestive to many a mechanic who wants help in instructing his sons.

TRADE NOTES.

THE GURNEY HOT WATER HEATER COMPANY are steadily getting their form of heating apparatus before the public, and in a recently issued circular they direct special attention to the fact that at the Sixteenth Exhibition of the Massachusetts Charitable Mechanics' Association, which was held last year, they were awarded a gold medal and diploma for excellence of house-heating apparatus; they also received a bronze medal at the fair of the American Institute, held in New York last year.

IN EMULATION of the Western manufacturers, who for a year or more have had a combination in the door, sash and blind trade, firms devoted to this industry situated in New York, New Jersey, Pennsylvania and New England generally met a short time since in Boston for the purpose of perfecting a similar trade organization. The pool then constituted includes 55 large manufacturers in New England, 30 in New York and 10 in New Jersey and Pennsylvania. These concerns claim to do about three quarters of the total business of the Eastern States. As a result of this combination it is expected that prices will be advanced, and that incident to this change in prices a complete revolution of the list will be undertaken. Production is to be regulated, and each concern will be given a quota of the work, based upon its present capacity. Each concern is required to pay into the pool a certain sum of money, and any firm infringing the rules of the combination is to be fined from the moneys so deposited. The affairs of the combination are in the hands of the officers, consisting of president, vice-president, secretary, treasurer and a board of directors of five members. These officers will from time to time revise the schedule of prices, and not only will the firms in the combination be required to submit accounts of their sales and prices, but their books are also, at all times, to be open to the inspection of the officers appointed to examine them.

FRANK H. CLEMENT, the well-known builder of wood-working machinery, of Rochester, N. Y., sends us a copy of his illustrated catalogue for 1888. It is an attractive, well-printed pamphlet and one which shows on every page that great care has been taken in its preparation. There are illustrated in it a number of machines which have heretofore appeared in our columns as "Novelties," together with additional new devices, which render the book of interest to all users and buyers of wood-working machinery. Two pages are devoted to an improved carving machine, which has features to commend it to the use of all who wish to add decoration to the work that they produce.

THE THORN SHINGLE AND ORNAMENT COMPANY, Twelfth and Callowhill streets, Philadelphia, Pa., send us specimens of their round-nosed tile with side locks, dies for which have been recently completed. This tile in its general dimensions is 8 x 12 inches. It is adapted to cover 8 x 8 inches. It is provided at the side with the spring lock, for which the general line of goods to which it belongs is famous, and it has in the center a sway-back rib and at the lower edge a flange, giving the appearance of thickness. The samples before us are painted in a new shade, and are much better imitations of red tile or terra-cotta than anything else of the kind that we have examined. This general line of goods is fast becoming very popular, and the new article above described cannot fail to increase the demand.

THE CURREY MFG. COMPANY have engaged in the manufacture and sale of paints, colors, putty, &c., at 211 and 213 South Clinton street, Chicago. It is their purpose to make a high grade of goods in all lines, for which they are provided with ample facilities. The circulars which they have issued show a great variety of very beautiful tints. The president of the company is J. Seymour Currey, late secretary and treasurer of Coffin, Devoe & Co. Arthur L. Currey is secretary and treasurer.

WILSON BOHANNAN, 1013 Broadway, Brooklyn, E. D., N. Y., has issued a miniature catalogue, vest-pocket size, of his locks, including padlocks, night latches, dead locks, drawer, cupboard and chest locks, &c. There are a number of novel features in the design and construction of several varieties of these goods that are of more than passing interest to our readers. An improved mortise night latch, recently patented, has special features to recommend it to use.

THE SQUARE HOLE BORING MACHINE COMPANY, of Terre Haute, Ind., present in another part of this issue an engraving of the machine which gives the company its distinctive title, and an article which has been greatly improved within a short time. The device has been made so light that it can be conveniently carried by one man, and yet it is strong enough to do the work for which it is intended. It is claimed to do the work of three men and yet requires less power than the old style round auger.

A VERY ATTRACTIVE little pamphlet has been issued by J. W. Bailey & Sons, 14 Charlestown street, Boston, Mass. This firm are wholesale and retail dealers in wood mantels and similar goods, and the catalogue which they have put out is of exactly the kind which many builders have been seeking in vain in various directions. The styles, for the most part, are inexpensive and yet attractive in appearance, and they are presented in a shape and form to serve the interests of would-be purchasers. Nearly all the designs are priced in different woods, both raw and finished. Bracket shelves, as well as mantels, are shown. In addition to the stock goods, the firm make to order wood mantels of all descriptions from designer's drawings.

J. B. JOHNSTON, 119 Lake street, Chicago, Ill., has sent us a copy of his catalogue of builders' hardware, house trimmings, store door work and stable fittings which has just been issued. It is a handsome book of 124 pages, thoroughly illustrated, carefully printed, and bound in semi-flexible covers. The range of goods is clearly indicated by the title. The purpose of the catalogue is to present in compact and intelligible shape a sufficiently extended line of builders' hardware to meet all but the most exceptional requirements. The object that Mr. Johnston has in view is to secure the patronage of the building classes. The announcement in his preface states that he is prepared to bid on specifications, to make contracts and to furnish, in large or small quantities, goods of standard quality at prices that cannot fail to be satisfactory. The catalogue is one which builders generally will be pleased to examine.

THE BRIDGEPORT WOOD FINISHING Company, manufacturers of Wheeler's wood filler, have recently removed their New York office to 240 Pearl street, corner of Burling Slip.

A VERY NEAT PAMPHLET descriptive of paneled sheet-iron ceilings, and cap seam and crimped iron roofing, has been issued by Henry S. Northrop, who has recently establ shed a factory at the corner of Centre and Franklin streets, New York. A number of patterns of ceilings are shown, together with a page of details of construction and variation in design. Crimped cap seam roofing is illustrated, with careful descriptions, including instructions for putting in place. The pamphlet has been carefully prepared and is something that will be preserved by those who receive it.

THOSE OF OUR READERS who want a tool for light boring, screw-driving, &c., operating upon the spiral principle, will be interested in Reed's Lightning Brace, illustrated in the card of the manufacturer, A. H. Reed, Market and Thirtieth streets, Philadelphia, which appears in another column.

T. B. RAYL & Co., Detroit, Mich., flavor their advertisement, which appears in another part of this issue, with some pleasantry. We cannot reproduce their humor, and, therefore, refer our readers to the illustrations and descriptions which their card contains.

THE MCLAGON FOUNDRY COMPANY, New Haven, Conn., are directing attention to an improved iron cellar window frame and sash which they are putting upon the market. They announce in their card, which appears in another part of this paper, that three sizes are now ready. The advantages claimed are strength, convenience, economy and an attractive appearance. Incidentally they mention its freedom from swelling and shrinking, warping and binding. The price list is offered to all applicants.

MORSE, WILLIAMS & Co., the well-known manufacturers of passenger and freight elevators, have recently removed their office from 411 Cherry street, Philadelphia, to 1105 Frankford avenue. Their New York office is at 108 Liberty street.

THE PULLMAN SASH BALANCE COMPANY, of Rochester, N. Y., are directing attention to the sash balance which they are producing, and recommend it as being cheaper than weights, with many special advantages. It is claimed to balance the sash perfectly, to be adjustable, and to avoid breaking the cords.

E. D. ALBRO & Co., of Cincinnati, Ohio, have long been known as specialists, dealing in mahogany and other varieties of imported hardwood, including veneers, &c. Their card appears in another part of this issue, and will prove a means of introduction to a large circle among our readers who are using such material.

THE NATIONAL SHEET METAL ROOFING COMPANY, with factory and general office at 510 East Twentieth street, New York, announce a Western office at No. 3141 Cottage Grove avenue, Chicago.

THE CORTRIGHT METAL ROOFING COMPANY, Broad and Race streets, Philadelphia, present in their card in this issue their line of Gothic shingles laid with the Cortright plain ridge coping, and also their shield pattern tile, laid in the same manner. They are directing attention to a line of specialties, including ridge coping, hip finish, valleys, ceiling plates, siding, &c. Their tiles have the peculiar advantage of beginning to lay at the comb and finishing at the eaves, thus saving walking over the finished roof. Their shingles lay in the usual manner. The new catalogue for 1888 is ready and is offered to all applicants.

P. F. MCMAHON, 157 Wooster street, New York, is directing attention to cathedral, antique and mosaic stained glass of his manufacture. He offers to supply estimates on request.

THE WOOD DOOR KNOBS which J. Bardsley, No. 59 Elm street, New York City, is introducing have several special advantages. The "feel" of a wood knob in the hand is far more grateful than that of a metal knob; hence they are to be preferred for this reason. The knobs mentioned are also provided with wood escutcheons on the shank.

THE GARRY IRON ROOFING COMPANY, Cleveland, Ohio, are inviting the trade to send for circular and price list No. 69. In their card, which is presented in another part of this issue, they direct attention to their new metallic tile and shingle, a description of which is presented.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

ONE of our contemporaries suggests that all societies connected with the building trades will find a fruitful theme for essays and discussion in the matter of estimates and how to make them, and continues: One is often amazed at the variations existing among the bids made for the same work and from the same specifications by men who evidently intend to do the same grade of work. For instance, tenders are asked for the superstructure of a bridge, for a job of plumbing, for galvanized iron and tin work, for painting and decorating, for mason and brickwork, &c. In almost every case the exact cost of material required may be estimated, leaving labor the only variable quantity. It would seem that in a large experience the master workman should be able to estimate, within a very small percentage, the exact amount of this quantity, and thus by adding a percentage of profit, now quite well defined in all trades, if not in the professions, tenders made by responsible houses for a certain piece of work should be approximately the same. But they are not, and the variation commonly runs from 10 to 50 per cent. and often exceeds 100. It is certainly somewhat difficult to determine the real causes for this state of affairs, which, it must be admitted, is a source of great evil, perhaps greater than many are aware of. For instance, an owner, unfamiliar with the details of the work which he wants done, asks his architect for specifications, and, indeed, for an estimate, for the cost of a building is always determined beforehand in a general way. Armed with these specific directions and this rough estimate given by an expert, the owner proceeds to call for bids. Each bidder examines the specifications carefully, and sends, under seal, the price for which he will do the work. On a certain day, and with some formality, the owner opens the bids, and finds them, it may be, running from $5000 to $10,000, while his architect's estimate, it is quite safe to assume, was less than the smaller sum. What must be his thoughts. Evidently that all bidders did not design to give, and would not give, the same material and workmanship, notwithstanding the specifications were explicit and to be fulfilled by only one grade of work. This inference assumes that some of the bidders were not honest men, and it seems to be the only conclusion one can draw from the premises. Thus it is to be seen the trade and the tradesmen concerned fall a notch in this man's estimate, and so it is the reputation of both trade and tradesmen is formed, and it is a reputation for dishonest dealing. This is a view from without.

HOW is it from within? Carrying out the assumption that all bidders are honest, the man of one extreme is forced out of the field by so-called competition, while the one at the other is forced out by losses. This is, in a measure, the condition in many lines of business to-day, and its correction manifestly lies in teaching men how to estimate, which is to be done, as we suggest, by discussions in the various organizations or societies to be found in all trades and professions. On the other hand, we are forced by knowledge to assume that some of the bidders are dishonest, and will make a profit on all work done at whatever price it is taken, and the lower price is made to obtain the work, and is made upon a thorough knowledge of its cost if properly done. For this condition, which seems to obtain more generally in some lines of business than in others, there is no remedy, except, perhaps, in the hope that honesty will prevail! Our contemporary concludes: "We know of a gentleman who is about to build a house in St. Paul, and who has apparently taken the view suggested of this problem. He has given an order to a builder to erect his house, the price of it not having been mentioned. Who shall say that this if not the best solution of a difficult problem that presents itself daily to every man who has a business transaction, small or large, involving the purchase of a pound of butter or an order to build a house?"

IT must be evident to any one who has inspected the business buildings recently erected in New York that the architectural features of the lower part of the metropolis are passing through a transitional period. Many old buildings are being torn down and modern buildings are erected in their places. Of all the business buildings and a considerable portion of all other buildings that were erected 20 years ago, it is believed that there will not be found one in a hundred remaining ten years hence. Several reasons combine to make this opinion probable, the principal one of which is the manifest demand for every possible square foot of inclosed space that can be had anywhere on Manhattan Island. This was not always so. It is only within the last few years that the change began to assume shape and it is also a short time that the opinion has prevailed that the population of New York City—that is, the population daily engaged in employment within the city—would in time fill every available foot of space on the island, and continue to overflow, as it has for years past, upon the contiguous shores. The business district is constantly expanding. The elevated railroads have brought into the markets for business purposes many districts which were only a short time since restricted exclusively to residences. The amount of business to be transacted in New York will, unquestionably, steadily increase, and with it the necessity of more room with which to transact business will be demanded. The advent of the passenger and freight elevator made it possible to increase the area of available inclosed space without territorial expansion. This was to be gained by building structures higher by several stories than they had ever been known before, and this is the keynote to the present condition of commercial architecture in New York City.

WITH the increased size of buildings has come a greater demand than the country has ever previously known for architectural skill and science in their construction. New problems in economical and artistic architecture are involved that have never previously existed, and for which there are practically no precedents in the architectural archives of the world. This has been going on for years. However, it may be consistently stated that American architecture, as an independent school, began its existence with the invention and adoption of the elevator. Previous to that date the problems in civil architecture in New York were in but few essential points different from those which had been met by other civilized nations for many centuries. Whenever a building was required, the builder or architect, whichever was employed, had but little difficulty in adapting an old plan to fit the place, or of drawing up a new plan of the same general kind as had been in use many times before, and so things went on, duplicating styles almost indefinitely. All this is changed at present, and each new building of the better class goes up under conditions which are practically peculiar to it.

WITH these changes in architecture and in the science of building there have come corresponding changes from one material to another and numerous experiments in adapting materials to the needs of the case. First of all wood was tried, but it was speedily demonstrated to be unfit as a material for the upbuilding of a great city. Then came red brick as plainly and solidly thrown together as was possible, and with hardly an effort at consistency of expression or artistic design. Next granite held a brief, but more creditable sway. Perhaps the best example of granite architecture in the city is the Astor House, an almost perfect example of the Doric order of architecture. The reign of granite was followed by a period during which iron in fanciful imitations, with some attempt at the Corinthian order of architecture, was employed. Then came the brown stone era and with it more earnest and

effective attempts at unity and consistency of architectural expression. After a time it was discovered that there were good and bad qualities in brown stone and the use of brown stone in business structure was early discontinued, although it has held its sway in dwellings for many years past. The fact that it will not withstand fire was a good reason why it should not be employed in business buildings. The materials which are at present used in business structures which are going up in different parts of the city are, in effect, a mixture of all that has been described. Iron, granite, brown stone, brick, terra-cotta and other materials are employed, the use of each being judiciously selected, according to the particular places in which it is required. Some of the modern business buildings of New York are extremely beautiful in themselves, and yet they are not to be judged by the canons of art of a previous era. The new order of things is fast taking the place of what preceded, and it requires but little imagination to believe that in a short time this city will be one of the most beautiful on the Western continent, if not of the whole world, simply because of the character of its buildings and their fitness for the places in which they are erected.

THE conception which some sheet-metal workers have of an eagle is only to be appreciated when a caricature of the noble bird is seen poised above a piece of cornice work. Unfortunately, sheet-metal workers have been trained in the practical side of their trade only. The artistic side has been left to take care of itself. Sheet metal statuary, eagles and other work of the same general kind are seldom molded, but are constructed, tinker fashion, out of such parts and pieces as can be gathered together, and the result is something fearful and wonderful to behold. We have in mind an alleged eagle of some 14 feet spread recently put on a building less than a mile from the corner of Central Park, New York. The bird is of the combination variety, possessing a body that reminds one of an animal rather than a fowl, covered with feathers that grow in regular circles, resembling the scales of a fish, and with wings poised in an awkward way as though he was scared at his own apparition. We do not know how long architects will be patient with things of this kind, but we think ultimately there must come a reaction, and that there will then be demanded of sheet-metal workers the same degree of artistic excellence as is now secured in stonework, terra-cotta work and in work in many other materials.

ARE any of the readers of this paper ever tempted to exaggerate? We dare answer in the affirmative, because the circle of our readers is so large that it includes people of all temperaments, and the tendency to exaggeration is almost universal. It would be strange, indeed, if exaggeration did not frequently occur in the daily conversation of our readers, and yet in the letters which we receive there is but little of this tendency manifest. Truth is sometimes a relative term. Absolute accuracy is as rare on earth, perhaps, as absolute sanctification. For example, a dozen people witness an occurrence and afterward describe it. Each description varies from the other because each pair of eyes looked at it differently; each person, no doubt, tells the truth from his own standpoint, and yet what he says does not appear to be the exact truth, without embellishment, from the standpoint of the other witnesses. This shows that we should be very careful how we upbraid people for not seeing things as we see them. They tell the truth, as they know it. So do we. All stories vary. This is the result when there is no question about honesty.

IN some cases, however, truth is not a relative; it has no relation whatever. When a man goes fishing, for instance, it would seem that he catches everything except facts. He is liable to increase the length of his scaly victims; there is a tendency to add to the performances of his line, and he even romances about his bait. If an insect bites him he straightway multiplies it into a swarm; if the sun shines warmly he makes the heat tropical. Under these circumstances he seems to forget all about accuracy, and unfetters his ingenuity for unlimited exercise. These general reflections have no special application at present, and yet they are often forced upon us by what we see and hear. When an average person sees a snake, it is a big snake. When the same individual travels on an accommodation train, it is the slowest train that ever ran. When he sees a baseball game in which the home club is defeated, it is the worst game he had ever seen, and when he sees a building built by a competitor and rival, it is as a matter of course a tumble-down, ramshackle structure, and the feeling exists that it is strange indeed that people will employ such a man to put up their buildings for them when better ones are available.

NEW PUBLICATIONS.

PRACTICAL HINTS FOR DRAFTSMEN. By Charles William MacCord, A. M., Sc. D., Professor of Mechanical Drawing in the Stevens Institute of Technology, Hoboken, N. J. Quarto; 100 pages; 68 cuts. Bound in cloth. Published by John Wiley & Sons. Price, $2.50.

Professor MacCord, of the Stevens Institute, Hoboken, N. J., occupies a very high position as a teacher of mechanical drawing. That he is a successful teacher is attested by the proficiency of many of those who have graduated from his classes. The work which is before us may be supposed to contain the best efforts of his mind in the direction named. The publishers have seen fit to bring it out printed on most excellent paper, and apparently have given careful attention to other portions of the make-up of the book, so far as type features are concerned. Unfortunately, however, the illustrations have been produced by a cheap process, and are far less satisfactory than would be some of the drawings done under the professor's eye even by novices. This is the only criticism that we have to make on the work, and we refer to it because the readers of *Carpentry and Building*, accustomed as they are to the fine lines of elevations and details given in our columns, will hardly fail to observe upon examining this book that the illustrations are less satisfactory than they might have been. The work is comprised in four chapters, together with an appendix and index. The first chapter is devoted to general definitions; the second treats of bolts, nuts, screws and rivets; the third of free hand sketching, and the fourth of drawing instruments and materials. In the appendix tables are given showing the proportions of bolts, nuts, threads, &c., according to the Sellers and Whitworth systems. Referring again to the question of illustrations in the book, it is to be stated that those employed in the chapter relating to drawing instruments and materials are relatively better than those in other parts, although they might have been improved.

CARPENTER'S AND BUILDER'S ASSISTANT AND WOODWORKER'S GUIDE. Sixth Revised Edition. By Lucius D. Gould. 78 pages. 36 plates. Octavo. Bound in Cloth. Published by W. T. Comstock. Price, $2.50.

Mr. Gould's works have been before the public for a number of years and have had a large sale. Recently his "Carpenter's and Builder's Assistant and Woodworker's Guide" has been revised and enlarged. Accordingly the sixth edition has been made more valuable to woodworkers than anything that has preceded it. Eight plates in the work are devoted to steel-square problems. In this respect we believe no change has been made, comparing the present edition with those which have preceded it.

THE PLATES.

In Plate XXI is presented a perspective sketch of a story-and-a-half frame dwelling, designed by E. H. Hammond, New York. The elevations, plans and a portion of the details will be found on other pages in this issue. The remaining details we reserve for another occasion, our space not permitting the presentation of the entire study in this issue. In this plate we also show some designs of capitals, being reproduced from work in the Laon Cathedral, from drawings from Mr. H. P. Adams.

Plates XXII and XXIII contain some designs of German Renaissance timber architecture. The designs are reproduced from a work published by E. A. Seemann, of Leipzig. It is scarcely necessary to occupy space with a detailed description of the designs. Brief mention of what they are will suffice. Fig. 1 represents a corbel from a house in Plötzerstrasse, Lüneburg, and shows a style of carving frequently applied to brackets and posts. Figs. 2 and 3 illustrate typical examples of decoration found in the towns of Hildesheim and Halberstadt. Fig. 4 presents a view of the celebrated gabled Knockenhauer Amthaus, at Hildesheim, and furnishes an excellent example of the rich treatment adapted for the elaboration of fronts to timber buildings erected during the more prosperous period of the German Renaissance. Fig. 5 is an elevation of the Hütte'sche Haus, in Höxter, and furnishes a suggestive design, dating from 1565. Along the front, above the first-floor windows and over the central archway, is carved a legend in raised letters, adding greatly to the interest of the house. The fan-like enrichments are good specimens of a very common type of ornamentation frequently seen in buildings of this date. On the same plate we show a handsome design for tiling and also one for a parquetry floor, by R. Fischinger, some of whose designs we have before presented to our readers.

In Plate XXIV is a design for a paneled ceiling, being a desirable addition to several pieces of work of its kind which we have published in the past. Close inspection of the design reveals the profiles of the moldings of the coffers, although at first they might not be apparent.

THE carpenters' strike in Providence appears to have been a complete failure. Only 200 men out of 1400 are reported as having been induced to join the Union.

Lightning Rods on the Ponce de Leon Hotel.

An exceptionally complete and well-designed system of lightning rods has recently been erected on the Ponce de Leon Hotel, San Augustine, Fla., by Mr. N. Wallace, of Waterbury, Conn. The hotel is a very large and handsome building, with which many of our readers are undoubtedly familiar from the extensive notice that has been given to it. It was built recently by Mr. H. M. Flagler, of this city, last season being the first one in which it was occupied. In Fig. 1 we present a roof-plan of the building, showing the arrangement of the lighting rods and the positions of the groundings. The material used upon this building is the best quality of round rods of lake copper $\frac{7}{16}$ inch in diameter, drawn in continuous lengths to fit the building without necessitating the use of joints. The rods are drawn in lengths of 276 feet and weigh 0.76 pounds to the running foot. The lightning rods are connected together all over the building, besides being brought in contact with all roofing metals, iron and copper finials, ventilators and steam pipes, though they are not connected with the conductor pipes. This network of rods and metals is connected in the ground at the points shown in the engraving with copper plates 24 x 24 inches square and $\frac{1}{8}$ inch thick, weighing 25½ pounds each. The rods are brazed solid to these plates, which are laid in trenches 20 feet from the wall and at a sufficient depth below the surface of the ground to bring them lower than the water level, which, where the hotel is situated, is at a depth of 4 or 5 feet. In this way a very perfect ground connection is obtained, as the copper plate gives a large surface, which is always in contact with moist earth. Where it is necessary to make joints a 2-foot splicing is used, the joint being wired solid with copper wire and then soldered thoroughly with hard solder. Referring to the figure again, the reader will discover the location of the different points by noticing the stars which are shown in the drawing, the sectional squares being chimneys. In addition to protecting each chimney, however, the rods are erected on the tower ventilators, and along the ridges, as shown in the plan.

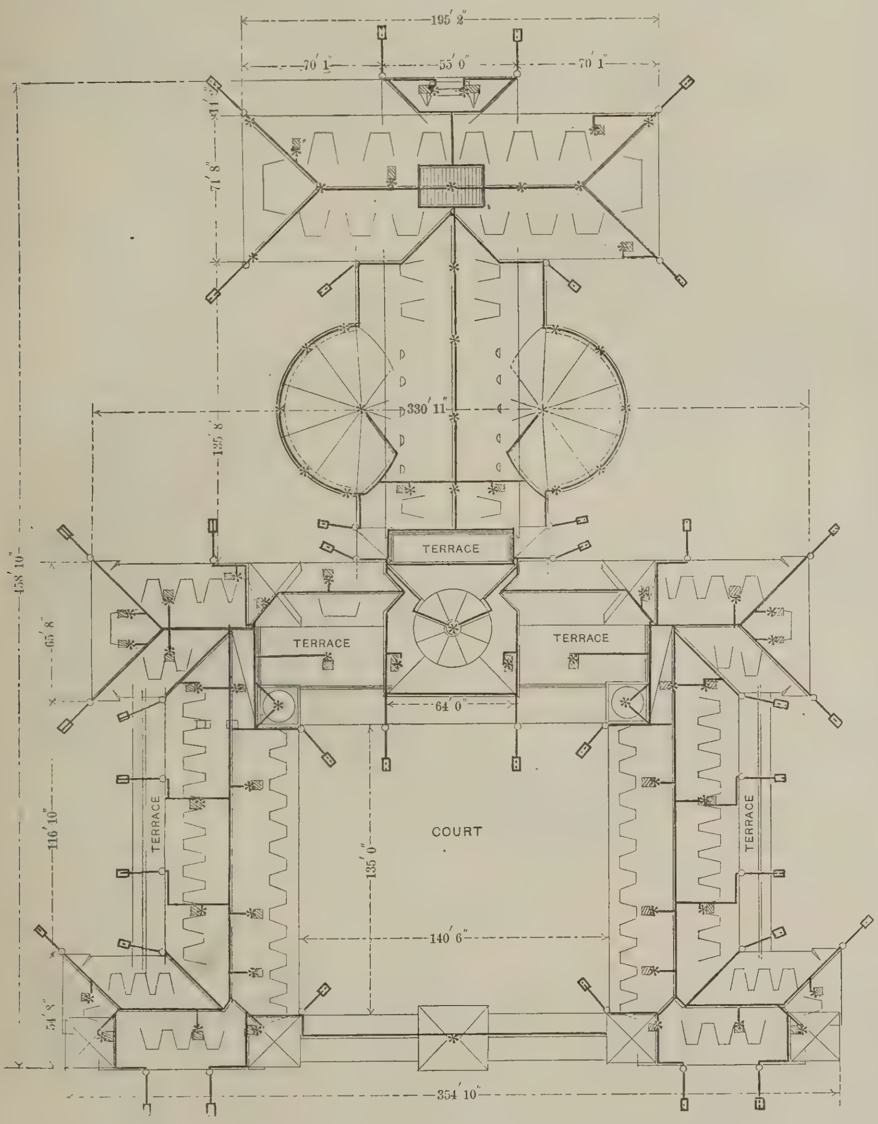


Fig. 1.—General Roof Plan of Ponce de Leon Hotel, St. Augustine, Showing Lightning Rod System.

According to the best modern practice the rods are not insulated in any way, but are connected by copper fastenings direct to the building itself, and are fitted close to the walls. Of course in so great a length of copper the variation in temperature is very extensive, and therefore provision has been made for contraction and expansion due to varying degrees of heat and cold. Separate branch rods connect the whole system with the water tanks and all supply pipes in the building, solder joints also being made with the tin roofing. The chimneys on the Ponce De Leon Hotel are very high, extending in some cases 20 feet above the roof. The rods, however, are carried 2 feet above the top of the chimney, and are bolted to it so as to insure a strong fastening. The rods carry single points drawn sharp, the extremities being heavily gold-plated so as to preserve the bright surface necessary to efficiency. The rule under which the building was fitted is based on the assumption that a point protects a circle whose radius is twice the elevation of the point above the surface considered. In connecting the points with the rods the former is tapered 3 inches and threaded, a 2-inch sleeve then being screwed over the two parts and hard soldered, thus providing a solid and secure joint. The roof of the Ponce De Leon Hotel is of tin plate, the valleys and gutters are galvanized iron, and red tiling is used on the dormer windows and towers, the latter being finished with copper, and the dome topped with a large copper lantern. The chimney of the Ponce De Leon Hotel running from the boiler house, is situated directly in the rear of the hotel, about 75 feet distant. The chimney, views of which are shown in Figs. 2 and 3, is 125 feet high, and special measures are taken for protecting it against lightning, as the ascending current of hot air is supposed to render a chimney particularly liable to this danger. As will be seen in the two figures mentioned, a complete circuit of the top of the chimney is made, and points at each corner are provided 20 inches high, the whole being connected with two ground connections of copper plates attached in the same manner as those used on the roof rods.

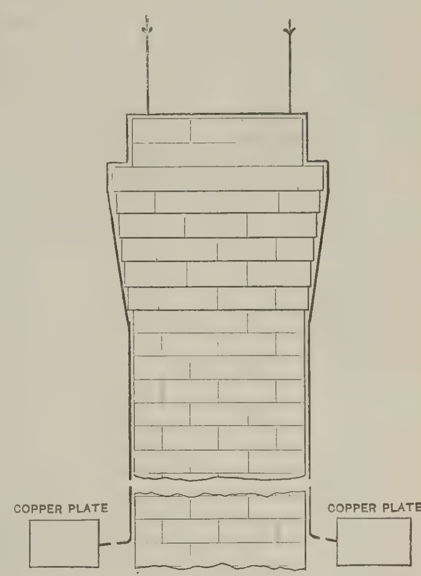


Fig. 2.—View of Boiler House Chimney Showing Rods and Groundings.

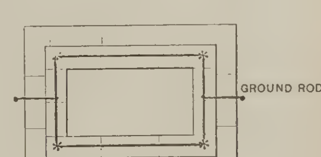


Fig. 3.—Plan View of Chimney.

Mr. Wallace has also had charge of the erection of the lightning-rod system of the Hotel Alcazar, situated in the same city. He informs us that the system of protection adopted is practically the same as on the Ponce De Leon Hotel, and that the same care has been exercised in designing and erecting the system of rods.

The Cadillac (Mich.) Business Men's Association are calling the attention of capitalists to the hardwood resources of their region, and will aid in the establishment of wood-working industries.

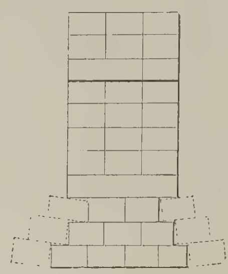
BRICKLAYING.

Brickwork and Bricklaying.—II.

BY ARTHUR SEYMOUR JENNINGS.

In the last paper an illustration was given of the bond which is frequently employed in forming footings for walls. It should be remarked at once that there are many objections to that arrangement. The question of the relative number of headers and stretchers employed is one upon which bonding of all kinds depends. A "stretcher" is a term applied to a brick which is laid with its longest length parallel with the length of the wall, and a "header" is one which is laid in at right angles thereto. Where possible every brick in the footings of a wall should be laid a header. The reason of this will be clear on a little consideration. The bricks laid in the outer course of footings, if put in stretchers, only lap in the wall two inches, and there is a great tendency for them to become displaced, as indicated by Fig. 1. Where, however, they are laid headers, three-fourths of their length is bound into the wall, and they can scarcely fail except it be by reason of the bricks themselves splitting in pieces. The general form recommended for footings is that shown in Fig. 2, and the arrangement will produce as strong footings as can be had. In the case of very heavy buildings the tendency of the bricks to break may be overcome by building in two courses at the bottom, which is the weakest point. (See Fig. 3.)

The bricklayer has, we will suppose, now built his footings and proceeds to erect the walls. Mortar and bricks are brought to him by laborers and placed around him as he works. The well-known trowel may be said to be his chief tool; with it he cuts the bricks when necessary, puts the mortar in position, and strikes the joints. It has already been remarked that the operations of the bricklayer are not all that could be desired. Let us see what he does. Taking a case of an inside wall, or one of which the surface will not be exposed, the proceedings are as follows: He first takes a trowel full of mortar and slaps it down upon the footings beneath. He then takes a brick and, putting it upon the mortar lengthwise with the direction in which the wall is to go, squeezes it into position, tapping it with the end of his trowel to make it firm. He then takes some more mortar, throws it against the end of the brick and upon the footings, and places another brick beside the first one, fixing it firm in position as before. In this way he erects a little wall of the thickness of half a brick for a length of some 2 feet and of a hight equal to the hight of five or sometimes six courses of brickwork. Then he carefully measures across the footings and finds the proper position for the bricks on the other side of the wall, according to its thickness, and again erects a similar little wall to the first one. If it is a corner the small walls referred to will return generally at right angles. So far the operations have been very carefully performed; each brick has been properly laid, and the joints all trued up as it proceeds, and now comes the objectionable part of the operation. The operator takes his trowel and with it throws in trowel full after trowel full of mortar, until the whole of the space between the two small inclosing walls is covered. Now he throws on the mortar about a half a pail of water, and then with his trowel he mixes it with the mortar so as to thin it in consistency. Whole bricks, halves, and pieces of bricks are then, one after the other, quickly laid in position side by side, the thin mortar being squeezed up between them as each piece is laid. In this way the labor of placing the mortar around each brick separately is avoided, but as will be presently explained the work is weakened. When the hight of the outside portion of the wall is reached a course of headers is laid in much the same manner as the outer portions are erected, and in this manner the wall is brought up to its required hight. During the progress of the work frequent testing is made (or should be) with the level and plumb bob, and the whole of the outer joints are trimmed off or struck, according to the manner in which they are afterward to be finished. Fig. 4 represents a wall erected in this manner.



Brickwork.—Fig. 1.—Showing Displacement in Footings.

The object of the courses of headers, which are repeated in every sixth or seventh course, is to bind the wall together in the direction of its thickness, and by the building laws of most cities it is made compulsory that such courses should be inserted at these intervals. The writer, however, is of the opinion that much stronger brickwork would be produced by arranging the bricks with headers in every alternate course, and a description of a variety of bonding in which this is done will be given in a future paper.

The construction of external walls differs materially from that described. As a rule, pressed bricks are employed on the outer face, while a more common variety is used for the inside portion. All the face bricks are laid stretchers, of course, with the joints alternated. Bond is obtained in this case by laying bricks at the back in every sixth or seventh course in a diagonal direction, and at those points cutting off the back corners of the face bricks in order that they may lap. This is shown in Fig. 5. It will be seen that the whole binding between the inside and the outside of the wall in this form of building consists of the small triangular corners, and it is urged that such a bond is wholly inadequate. The fact that most pressed bricks are made of larger dimensions than common bricks, such as would be used for the inside, makes the objection more serious, for when the hight of the courses does not correspond on the inside and the outside no proper bonding can possibly be had. Moreover, the large mortar spaces which are left between the diagonal bricks increase the weakness of the structure. As a fact, iron anchors are inserted to tie the two walls together at these points. It would be very advantageous if brick-makers would adopt some universal standard size for bricks of all kinds, so that the proper bonding might be obtained throughout. Less cutting would be necessary, the work would be easier, and the result in the increased strength of the wall of not a little benefit.

The mortar used in brickwork has greater influence on the strength of the structure than is ordinarily recognized. The phrase which states that the strength of any structure is as the strength of its weakest part is particularly applicable in brickwork. Although the strength of the bricks and the manner in which they are arranged are important factors in determining the strength, yet it is the mortar which forms the adhesive material between them which practically determines the ultimate strength under most strains. If this is doubted let an examination be made of any buildings which fail by reason of bad brickwork, and it will be found that in 19 out of 20 cases the mortar will be at fault. Careful consideration should therefore be given to the proper manner of making mortar and to the selection of the material of which it is composed.

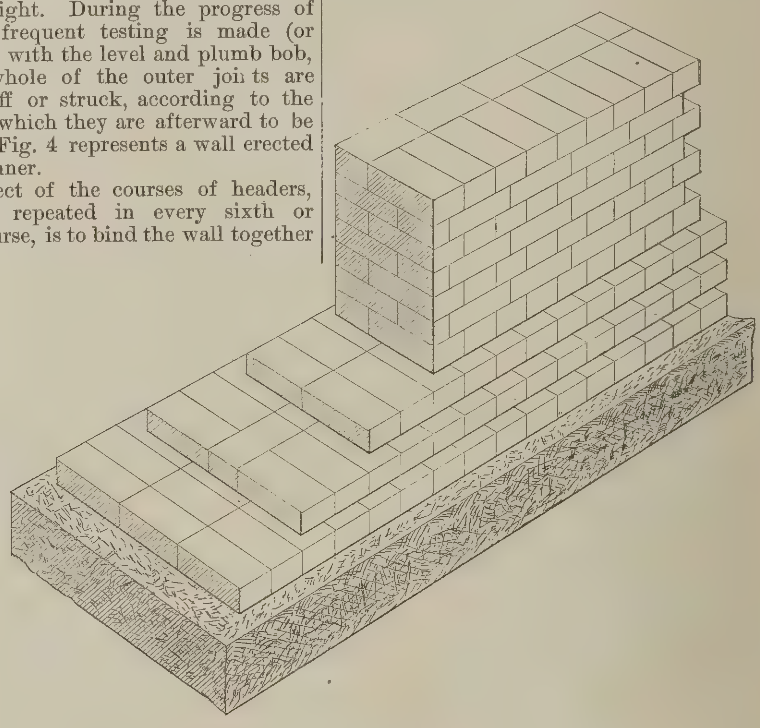


Fig. 2.—Best Form of Footings.

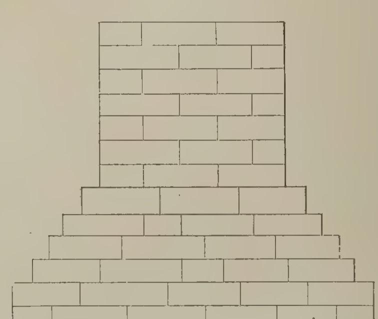
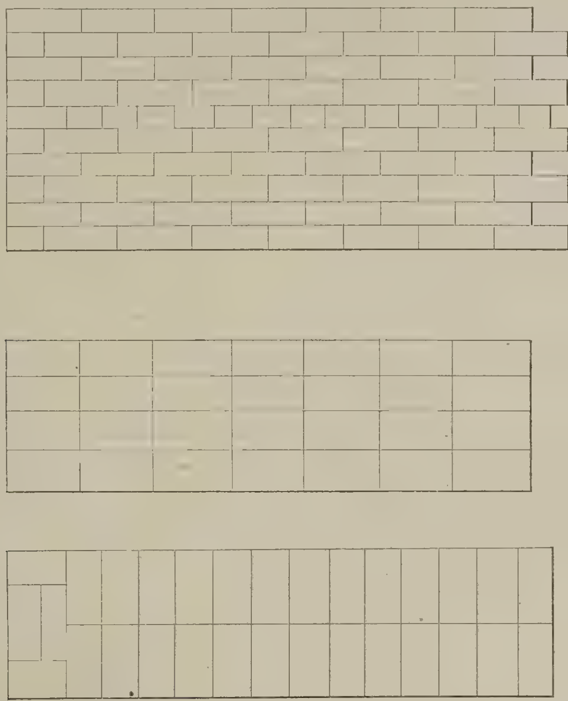


Fig. 3.—Footings for Heavy Buildings.

Sand or its equivilent mixed with lime or cement form the chief ingredients of all ordinary mortar. The sand should be clean and sharp and entirely free from organic matter. The presence of salt is objectionable, inasmuch as it produces dampness in the walls in which it is used.



Brickwork.—Fig. 4.—Plans and Elevation of Internal Wall in Running Bond.

As a substitute for sand, burnt clay ground into fine powder answers a fair purpose, while coarse ground coke or blacksmiths' ashes also serve. The quality of the lime or cement used has a considerable bearing on the quality of the mortar. It may be said that the practice of using white lime—or that known as pure or rich lime and which will not set in the presence of dampness—is to a great extent responsible for the poor quality of mortar which is in common use. No mistake should be made either on the score of pretended economy, or otherwise, of using any lime in making mortar which does not possess at least some considerable hydraulic qualities—that is to say, which will harden in water. The presence of silica, iron or alumnia is responsible for this quality, and it is as a rule not difficult to distinguish limes which have these characteristics irrespective of any experimental tests which may be applied to them by reason of the dark color which they generally bear. Mortars made with hydraulic limes will not only set quicker and be harder but will last considerably longer than that made with chalk or white lime.

The great value of cement mortars is frequently overlooked. Not only are they very useful in erecting those portions of the brick structure which are subjected to a very heavy weight, but in many other cases their use will be found to be advantageous. For example, in erecting a building on land which is very valuable the object is to keep the thickness of the walls as thin as is consistent with proper strength, and it may be that where cement mortar is employed the thickness of at least half a brick may be dispensed with. As to the mixing of the mortar it may be observed that the mortar mill is both economical and efficient, inasmuch as it utilizes waste bricks and cuttings of stone and other material, while the mixture is very thorough and the consistency uniform. Where, however, this is not available and the mortar is mixed by hand it is desirable that the proportions of the material should be accurately determined by measurement. As a rule the bricklayer or his laborer form on the ground a circle by means of a small intrenchment of sand. Within this circle is placed lime or cement and water is thrown upon the lime and an admixture obtained by means of a tool known as bricklayer's drag. It is of great importance that no more water than is absolutely necessary to wet the whole mass should be used, and it should be distinctly remembered that every drop beyond weakens the mixture. The practice of making mortar in large or small quantities differs greatly, and not a little controversy has existed on the subject. There can, however, be but little doubt that mortar which is made of proper materials is best mixed each day as required. When white lime is used, which, as already explained, it never should be, the result will be better if a large quantity is made, and it is remixed as required.

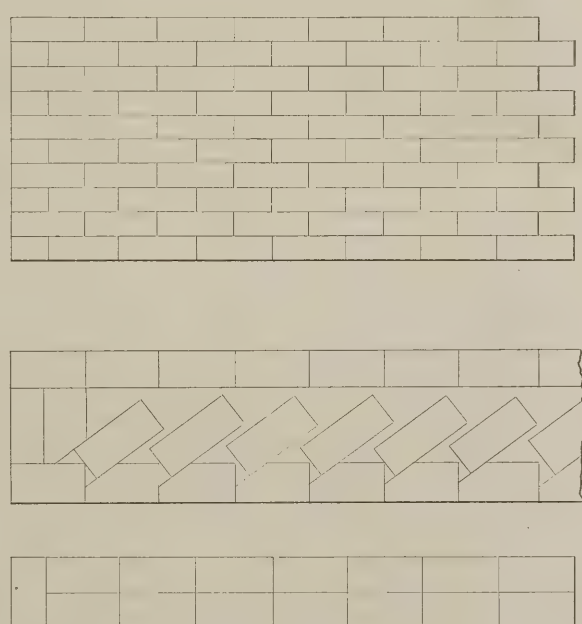


Fig. 5.—Elevation and Plans of an External Wall in Running Bond.

In regard to the use of mortar it may be said here that the prevailing practice is to make joints far thicker than are required; the object of the mortar is simply that of forming an adhesive material between the bricks, and as the former is in every case considerably weaker than the latter it will be obvious that an effort should be made to keep joints as thin as is consistent with proper form.

(To be continued.)

Finish for Redwood.

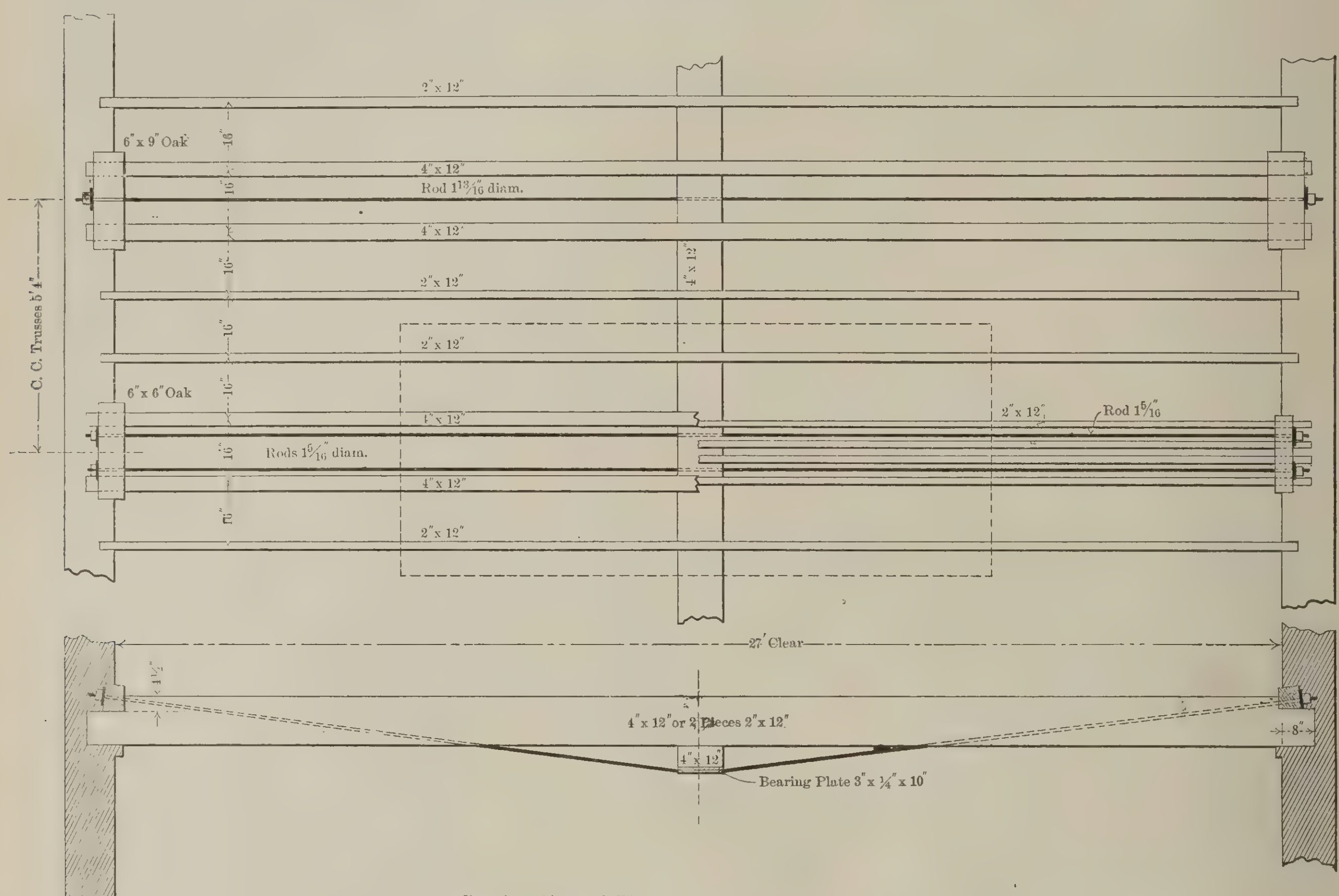
A prominent dealer in redwood supplies the following formula and directions for treating redwood finish. We understand it is a practice that has been indorsed by successful experience in San Francisco: Take 1 quart spirits turpentine; add 1 pound corn starch; add ¼ pound burnt sienna; add 1 tablespoonful raw linseed oil; add tablespoonful of brown Japan. Mix thoroughly, apply with a brush, let it stand say 15 minutes; rub off all you can with fine shavings or a soft rag, then let it stand at least 24 hours that it may sink into and harden the fibers of the wood, afterward apply two coats of white shellac; rub down well with fine flint paper, then put on from two to five coats best polishing varnish; after it is well dried rub with water and pumice stone ground very fine, stand a day to dry; after being washed clean with chamois, rub with water and rotten-stone; dry, wash as before clean, and rub with olive oil until dry. Some use cork for sand-papering and polishing, but a smooth block of hard wood like maple is better. When treated in this way redwood will be found the peer of any wood for real beauty and life as a house trim or finish.

VERY long runs made by steam engines are considered rare, and several days or a few weeks have been considered long runs. The most remarkable record, however, has recently developed in the Pittsburgh Gas Light Company, where a 10-horse Westinghouse engine ran continuously for 13 months, running at about 500 revolutions per minute, and in that time making 288,000,000 revolutions without the throttle being shut, and it is still running.

CORRESPONDENCE.

Strength of Floor.

From G. B. M., *Toledo, Ohio.*—I inclose a sketch of floor construction and a description of the same which, in some respects, criticises the floor plan of "C. R. J.," published in the April number. I have not shown all of my calculations, which I have thought unnecessary to do. I have kept the depth the same as "C. R. J.'s" floor, supposing that the depth was a fixed quantity. Other dimensions, such as distances from center to center, trusses, &c., have also been preserved. Referring to "C. R. J.'s" floor plan, I would say that the flooring, joists, plastering, &c., will weigh 20 pounds per square foot. The area, 144 square feet, multiplied by 20 pounds, gives 2880 pounds weight of floor. One-half of this goes to the walls direct, while the other half corresponds to that within the dotted lines in my diagram. Now, a $\frac{7}{8}$-inch rod placed as shown would be able to carry, with a factor of safety of 3, a distributed weight of 1760 pounds (within dotted lines); this, divided by 72 square feet, gives $24\frac{1}{2}$ pounds. Deducting 20 pounds for the weight of construction as above described, there is only $4\frac{1}{2}$ pounds remaining for the moving load per square foot. A crowd of people will weigh 80 pounds per square foot, and it is possible to pack a crowd in a room so as to weigh 120 pounds per square foot. I will assume that 80 pounds is my moving load and 23 pounds my floor weight, say 103 pounds per square foot, making a load of 7400 pounds for the space within the dotted lines. This brings a strain on the truss rods of 37,600 pounds. This, divided by 15,000 pounds, gives 2.5 square inches of iron required. This means, use a rod of $1\frac{13}{16}$ inch in diameter or two rods $1\frac{5}{16}$ inches in diameter. The screw ends should be $\frac{3}{8}$ inch greater in diameter than the rod. This tension on the rods brings a compressive strain of 37,560 square feet on the truss and beams, which, divided by 2, the number of beams, gives 18,780 pounds. This weight requires 30 square inches, and as the load requires 15 square inches, we have the demand for 45 square inches of section. I should use, therefore, 4 x 12 sticks and 2 rods $1\frac{5}{16}$ inches in diameter, placed as near the sticks as possible. In this case the head block need not be larger than 6 x 6 oak; but if a rod $1\frac{13}{16}$ inches in diameter was employed there would be the necessity of a head block 6 x 9 inches, all of which is covered in my sketch. If it is difficult to get 4 x 12 sticks, then use twice as many, 2 x 12 in section, with the $1\frac{5}{16}$ truss rod placed between them as is shown in the diagram. The center stringway should be 4 x 12 with bearing plate at truss rods. Extend the trussed beams 8 inches into the wall.



Construction of Floor Suggested by G. B. M.

From C. W. W.—*Allentown, Pa.*—In the April number of *Carpentry and Building* "C. R. J." asks for criticisms on a floor system which he presents. As the first sight showed me that the construction was not sufficiently strong, I have undertaken to calculate the strains, &c., and deduced from these calculations I give the size of timber and iron required for a floor system of the given construction and span. Perhaps some of the readers of the paper will be interested in what I present. At the outset, I would suggest that the construction, while not new, is cheap, easily put up and can be made strong enough to answer all ordinary purposes. The fault in the construction shown by your correspondent is that the timber and iron employed are by no means sufficient.

A. Girder Under Joists.—As the room over said floor shall be used as a meeting or lodge room, it will not be too high to assume for moving load and own weight of the structure per square foot 130 pounds, and as the joists are 16 inches *c* to *c*, the load on each joist is $27 \times 1\frac{1}{3} \times 130 = 4670$ pounds. Each joist rests on three supports, the two walls and the central girder in question, and as the distance between supports are equal it causes to the central support a weight of $\frac{5}{8} \times 4670 = 2920$ pounds. Now I will just double the number of tie rods—that is to say, will put one tie rod between each two joists, this will give me a free length of 32 inches for the girder, and it is loaded according to the diagram with the load of two beams, each load acting 8 inches from one support. The moment of resistance is = bending moment divided by the coefficient of the material, therefore

$$\frac{b\,h^2}{6} = \frac{2920 \times 8}{1200}$$

if I take $b = 4$ in. I get $h = 5.5$ in. and would use a timber of 4 x 6 inches, and have to bring in the 6-inch side vertically.

B. The Tie Rods.—In using 12-inch joists the angle between tie rod and joist is 6° 20′. Each tie rod is loaded with $2 \times 2920 = 5840$ pounds and the strain is

$$\frac{5840 \times 27 \times 12}{4 \times 18 \times \cos,\ 6°\ 20'} = 26{,}440 \text{ pounds.}$$

Allowing a fiber strain of 15,000 pounds for quiescent loads, the necessary cross-section of the rod is

$$\frac{26{,}440}{15{,}000} = 1.76 \text{ sq. in.}$$

and although the number of rods is doubled against "C. R. J.'s" construction, the diameter of the rods has to be $1\frac{1}{2}$ in. = 1.7671 sq. in., and the rods must have upset screw ends.

C. The Joists.—The compression of the joists in the direction of their length resulting from the tie rod is

$$\frac{5840 \times 27 \times 12}{4 \times 18} = 26{,}280 \text{ pounds,}$$

consequently for each joist 13,140 pounds. Allowing 1500 pounds pressure per square inch for white pine, the joists must have a cross-section of

$$\frac{13{,}140}{1500} = 8.76 \text{ sq. in.}$$

Of course it is understood that they are strongly bridged, not to allow any bending

of the joists sideways. About four times would do. Besides this pressure, the joists are loaded with the moving load of the floor and the weight of the structure for a span of $13\frac{1}{2}$ feet—that is, per joist $\frac{4670}{2}$ = (see *A*).

$$\frac{b\ h^2}{6} = \frac{4670 \times 13.5 \times 12}{2 \times 8 \times 12,000}$$

I take $b = 3$ in. and get $h = 8.9$ in. To resist the bending I have to take a timber 3 in. x 8.9 in., but as the joist has in addition to resist the compression from the

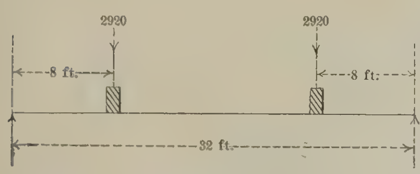


Diagram Accompanying Letter from C. W. W.

rod, which requires, as shown before, 8.76 sq. in., I must add to the hight

$$\frac{8.76}{3} = 2.92 \text{ sq. in.},$$

and it requires a joist of $8.9 + 2.92 = 11.82$ in. $\times$ 3 in. or 3 in. $\times$ 12 in. to be sufficiently strong.

D. The Head Blocks Under Nuts and Washers.—Each tie rod brings to these blocks the same strain as to the two joists belonging to it—that is, $2 \times 13,140 = 26,280$ pounds, which force acts in the center of a span of 16 in. In using oak:

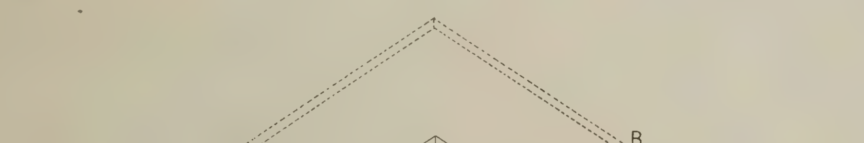
$$\frac{b\ h^2}{6} = \frac{26,280 \times 16}{4 \times 3000}$$

b taken $= 4\frac{1}{2}$ in. I get $h = 7$ in. I have therefore to take $4\frac{1}{2}$ x 7 in. in oak, but as this piece is weakened by boring for the $1\frac{1}{2}$ in. tie rod I have to add at least $1\frac{1}{2}$ in. to the width, and the blocks must be 6 x 7 in., or, better, 6 x 8 in. As washer under the nuts I would take a piece of 5 x $\frac{1}{2}$ in. iron 8 in. long. To make a good floor system in this construction requires therefore about double the amount of timber and six times that of iron, as given in sketch of "C. R. J.," and perhaps it would be in this case just as cheap to use built-up iron girders (plate girders) to support the floor, and put the joists between the girders. The part of the girders reaching below the ceiling of the store (about 6 to 8 in.) could be boxed in to have a better appearance.

In conclusion, I would remark that the said construction is better adapted to support a roof of greater span, the room under which shall not be obstructed by posts or columns, than for a heavy floor system. In a roof the tie rods can mostly be laid under a greater angle, as in a floor in which the hight of structure must be kept down as much as possible, and consequently the strains in the tie rods are reduced in most cases to such an extent that the construction is almost as cheap as if wooden posts were used as center support.

Barn Framing.

From W. H. D. B., *Hunter, N. Y.*—Various issues of *Carpentry and Building* have contained framing plans for barns, mostly all of large size and adapted for using hay-forks. I inclose a plan different from anything yet presented, and which, I think, is not without its merits. In this connection I would remark that this plan is useful where it is desired to have the lower floor or ground all clear, for example, for a wagon-house. The plan also serves quite as well under other circumstances. The frame makes a very rigid structure. The purlin post should be centered, tenoned, dovetailed and keyed into the beam, also drawbored. The beam should also have dovetailed tenons keyed into the post with draw bores, the frame without guards or guards either 3 or 4 inches in from the base of the post, according as we use either 3 or 4 inch studs. These extend from the sill-plate and are nailed or spiked to the guards. To support the floor timbers or joists we spike a 2 x 4 piece on the sides of the beam and let the ends of joists rest on these. We mortise or dovetail one or two of the joists in each tier for ties. We employ Novelty siding. If it is desired to use a hay-fork and the purlin-beam is in the way I would suggest the plan of framing as indicated by the dotted lines. A B indicates a rod with no strain. A guard should then be framed into the purlin post, where the plate is now, for top end of lower tier of rafters. This plan gives an excellent method of ventilation, and, to my notion, is better in both utility and appearance than the gambrel roof.



Barn Framing Contributed by W. H. D. B.

Roof Framing.

From T. D. G., *Council Bluffs, Iowa.*—My attention has been called to "F. L. S.'s" letter in the March number of *Carpentry and Building*. So far as it refers to my letter on roof framing, published in the February number, it would seem to me that I have been shabbily treated. Your correspondent is not only foolish but idle if he made the remark simply because you predicted my letter would be criticised. I am ready for honest criticism. If he or any other correspondent will point out the "shakes" in my method I will acknowledge my error, but unless there be reasons presented it would seem that the criticisms are not good ones. Referring to the sketch, you have not explained the seats of hip rafters. It should read, "A F, B F, C E and D E are seats of hips."

Length of Rafters.

From H. W. G., *Misha Mokwa, Wis.*—In the April number of *Carpentry and Building*, on page 84, "W. R. L." gives his rule for obtaining the length of rafters. The plan suggested is, apparently, an easy one, but I would caution your readers that in laying the square on the stick in a certain way, at certain figures a number of times, a person is quite liable to fall short of the exact length. The error will be less if the stick is short, and more if it is long. My method is to take the square, turn the side up that is divided into twelfths of an inch, take as many inches and twelfths of an inch on the blade as there are feet and inches in one-half of the width of the building, and as many twelfths of an inch on the tongue as there are feet and inches in the rise of the run. Then lay the rule on these figures and you are enabled to read the exact lengths in feet and inches of the rafters. The inch is counted as 1 foot and the twelfths as inches. This is a very correct and easy way of getting the length of a rafter for any pitch desired, and will be found accurate to a very small fraction of an inch.

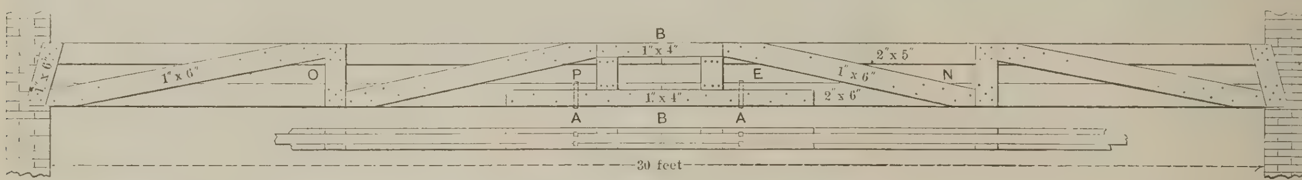
From W. H. C., *Chatfield, Minn.*—I have noticed in different numbers of *Carpentry and Building* that some of the correspondents are giving their methods for finding the length of rafters. As their object seems to be mutual instruction, I would like to add my mite to the good work. If the rafter is for a common pitch roof, I apply the square at 12 on the blade and the number of inches the rafter rises to the foot run on the tongue, and repeat as many times as there are feet in half the width of the building. This not only gives the length of rafters, but also gives the bevels for upper and lower ends of the rafters. This rule explains itself, for it is evident that every time the square is applied you are measuring 1 foot to or from the center of the building. In framing hip rafters for, say, $\frac{1}{3}$ pitch roof, I apply the square at 8 on the tongue and 17 on the blade as many times as there are feet in one-half the width of the building. I do this in place of the 8 and 12 as would be demanded for a common pitch rafter. At 8 will be the upper end down bevel and at 17 will be the lower end bevel. This bevel is obtained by taking the length of the hip rafter on the blade and its run on the tongue. Then the blade shows the side bevel.

From S. B. B., *Appleton, Wis.*—I would suggest a very accurate way of getting the lengths of rafters. Take your drafting

board and square and draw the run and rise. The angle line from the top of rise to the end of run will be the length of rafter, and this can be measured by whatever scale it is drawn, using the square. Set the bevel, or preferably cut a pattern and go ahead. By this plan there is not a figure to make.

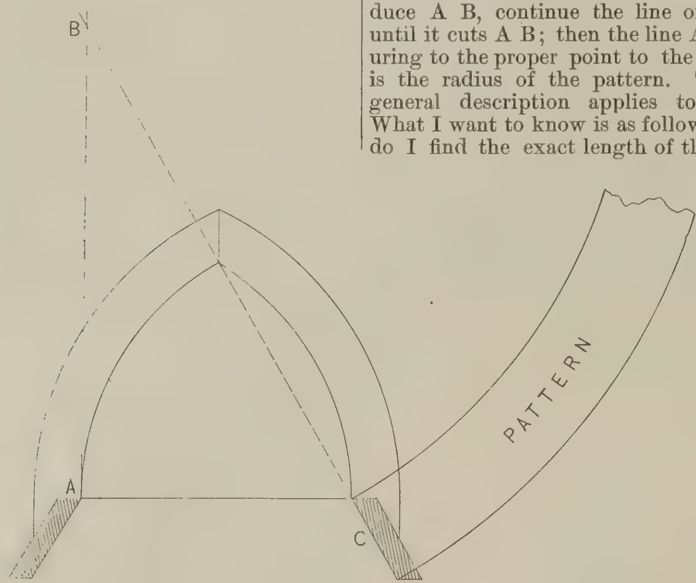
Joists For Long Spans.

From K. & Z., *Findlay, Ohio.*—Inclosed you will find a sketch of joists for long



Construction of Floor Joists for Long Spans Used by Kramer & Zoll, Findlay, Ohio.

spans. We are using the construction here shown in five school buildings that are being built in this vicinity this season.



Splayed Jambs.—Method of Striking Form for Gothic Jamb Offered by W. A. W.

The idea in making the joists in this manner is to use stock size of bill stuff, which can be had dry. The space between the top and the bottom cord affords the air space required by the Rutan system of ventilation. A A are keys; B B are joints, in 2 x 6 and 2 x 4 stuff. The 2 x 5 pieces are ripped from 2 x 10 joists. We find joists constructed as we show them better than 2 x 14 with 1 x 4 pieces nailed to each side, and they have the advantage of costing less. We advise that joists of this kind should be bridged at each cross-piece and crowned 1 inch in center. We are pleased to give this idea to the public, as we feel that it fills a long-felt want.

Putting in Foundations.

From J. C., *Winchester, Wis.*—I would like to have some of your readers who have had more experience than I to answer the following question: Is it a good plan to build the basement or cellar wall for a house in the fall of the year just before the winter sets in and leave it open all winter, not building the house on the wall until the succeeding summer? Would the wall be spoiled by freezing in winter?

Note.—Our correspondent is not so explicit in asking his question as he might be; for he does not intimate in his letter whether he would protect the walls through the winter or leave them without any covering. "Leaving open" is so broad a term that it may mean leaving the walls without any protection whatever, or it may mean simply leaving the cellar below open. We imagine that the answers he receives from our correspondents will turn somewhat upon these points.

Splayed Jambs.

From W. A. W., *St. Paul, Minn.*—Will some practical reader of *Carpentry and Building* present a practical way of drawing a splayed jamb lining for circle and gothic frames? I inclose what seems to me to be a presentation of the problem, and yet I am not certain that I am correct. Fig. 1 shows a gothic frame. The radius is the same as the width of the head. Produce A B, continue the line of splay C until it cuts A B; then the line A C measuring to the proper point to the side of C is the radius of the pattern. The same general description applies to Fig. 2. What I want to know is as follows: How do I find the exact length of the pattern for the gothic lining and how are the lines for the kerfs found? It is important to have these correct, or the piece will not bend to proper shape. I think this is a problem which will interest many of the readers of the paper, and therefore I present it for general consideration. Jobs of this kind are continually turning up; so it is very important to know the best way of managing them.

Removing Standing Seam Roofs.

From H. F. R., *Denver, Col.*—Is there a machine for cutting tin off a roof that is put on standing seam? I want something to cut out the seam entirely, leaving the edges straight on each side. If you know of anything of the kind, please give me the address of the makers.

Note.—We are unable to give our correspondent any information in the direction he suggests. We do not know of any machine made for the purpose. We think that there is a well-defined demand for something of this kind, and that if a machine were put upon the market calculated to cut tin roofs in the way he suggests, it would find ready sale.

REFERRED TO OUR READERS.

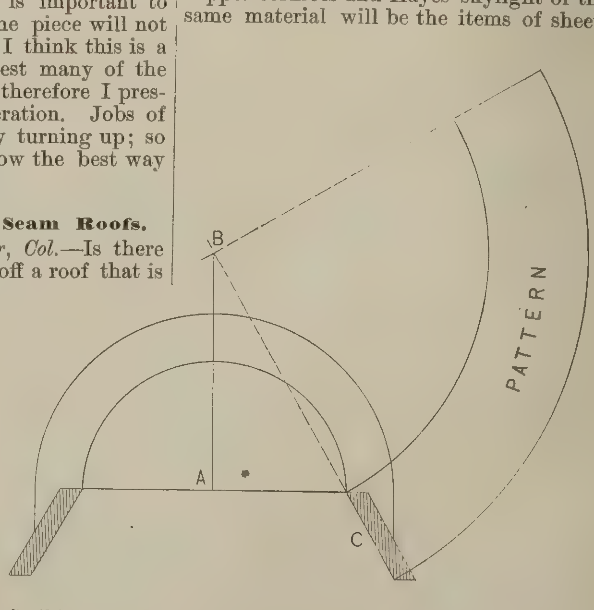
Shingle Staging.

From O. B. M., *New York.*—I would like to see discussed in *Carpentry and Building* the best way to put a shingle staging or scaffold on a roof, so that the new shingles will not be injured and the scaffold be of sufficient strength to carry men and shingles without risk and yet be easily removable. What I have in mind is an improvised scaffold in the simplest form. I think the readers of the paper might discuss this with advantage to all concerned.

Splicing Studding.

From S. B. B., *Appleton, Wis.*—I would like to ask the opinion of the readers of *Carpentry and Building* in matters referred to below: Where is the best place and what is the best way to splice studding for a three-story hotel building? The walls are to be 38 feet high to the plate; the studding is to be 3 x 4 inches. The building on the outside will be provided with matched fencing and veneered with brick.

Among the prominent buildings now in progress in the City of Baltimore may be mentioned the edifice of the Farmers' and Merchants' National Bank. This structure, when completed, will be one of the most strikingly handsome and conveniently arranged bank buildings in the country. We understand that it will be as perfect in every arrangement as money can make it. It will occupy a frontage of 63 feet on South street, with a depth of 85 feet on Lombard street, and will be five stories high. Potomac red sandstone will form the principal material used in the outside construction. Copper bays, copper cornices and Hayes skylight of the same material will be the items of sheet-



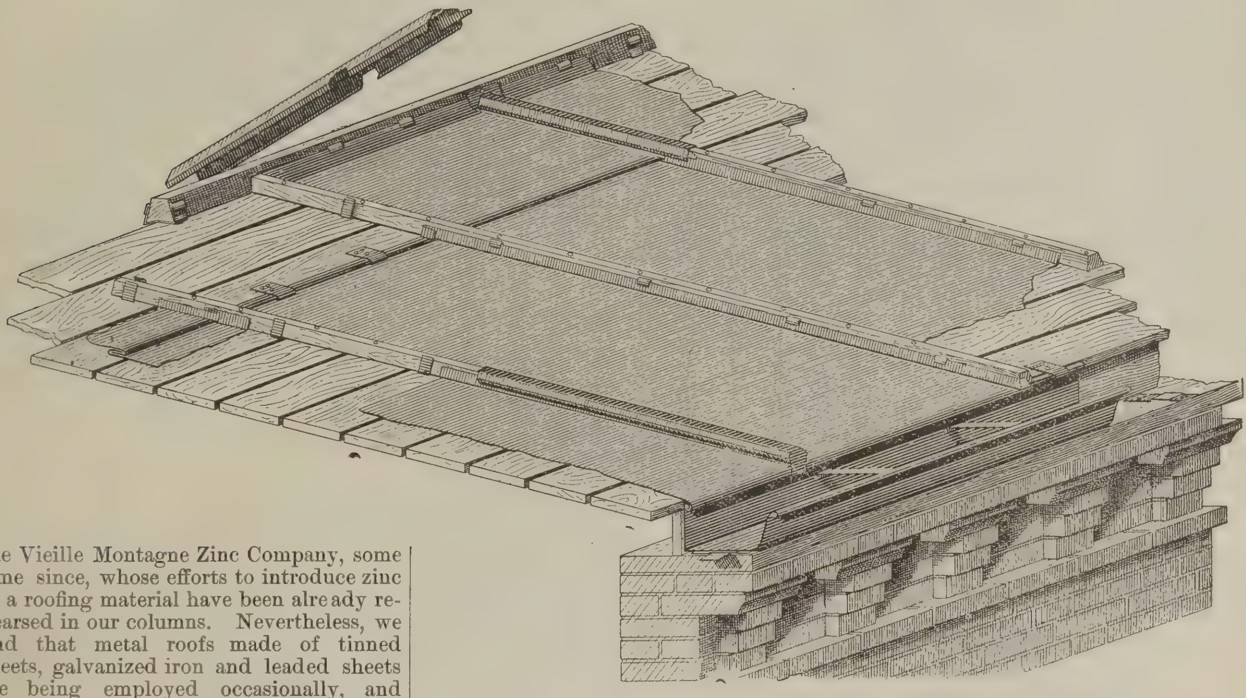
Striking Form for Semicircular Jamb Suggested by W. A. W.

metal work required. The contract for this work, including the roofing and spouting, is in the hands of John G. Hetzel & Son. The architects of the building are Baldwin & Pennington.

ROOFING NOTES.

German Metal Roofs.

The zinc roof is the usual type of metal roofing illustrated by our German mechanical and architectural exchanges, and is also shown in what little roofing literature of more permanent form has appeared in Continental Europe. The present form of metal roof as commonly laid in Europe is largely the outgrowth of the enterprise of the Vieille Montagne Zinc Company, some time since, whose efforts to introduce zinc as a roofing material have been already rehearsed in our columns. Nevertheless, we find that metal roofs made of tinned sheets, galvanized iron and leaded sheets are being employed occasionally, and where these are used the tendency is to put them in place in the same way as zinc has long been applied. In the construction of zinc roofs the utmost care is necessary in providing free contraction and expansion. Zinc is a delicate material to work with, so to speak, and the success of a zinc roof depends upon points which are scarcely regarded at all by layers of metal roofs in this country. And yet the difficulties which American mechanics experience with metal roofs are in directions which the care that European mechanics have learned to exercise with zinc would entirely obviate.



German Metal Roofs.—Fig. 1.—Metal Plates with Flanges Bent at Obtuse Angles, Fitting Against Wooden Fillet.

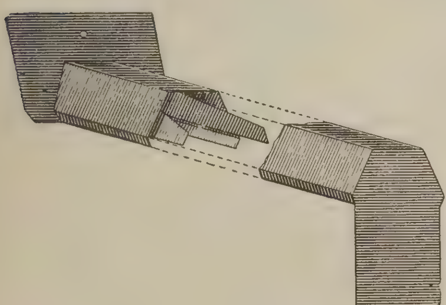


Fig. 3.—Detail of Cap.

In order to permit free expansion and contraction the side seams of zinc roofs are made over cleats or fillets of wood. The cross seams are made by the ordinary lock loosely fitted, and the edges of the metal are bent so as to avoid abrasion of the surface. That ideas of care in matters of this kind are beginning to have their force in this country is evidenced by the many accounts of variations in roof construction which we have published in the past. The roofs of the Johns Hopkins Hospital, in Baltimore, which we illustrated in these columns some time since, although of tin, is laid with cleats as above referred to. We have illustrated various constructions of copper roofs laid in the same manner, and we have also referred to methods of putting on galvanized-iron roofs where likewise cleats or fillets of wood were employed. In our columns only a week or two since a tin roof employing this feature was shown. That there is advantage in the raised seam over a fillet is scarcely to be gainsaid, and yet the tendency of roofing manufacturers, particularly those who are making sheet-iron roofs, is in the direction of making the seam out of the sheet itself, thus avoiding the use of wood strips.

We present at this time some cuts representing German metal roof construction, taken from a volume issued not long since, and compiled by F. Stoll, Jr., the editor of the *Illustrite Zeitung für Blechindustrie.* These show what is considered by this writer good construction of the kind that we have been describing. The first employs a fillet, which may be described as V-shaped in its general form with the point of the V cut away, placed on the roof so that its larger surface comes against the sheeting boards. The cleats or anchors, as they are commonly called in this country, are put in place by extending under the fillet, and are adapted to bend down over the upturned edges of the sheets, as clearly shown in Fig. 2 of the engravings. The locks between the cross seams, also illustrated in the cut last referred to, are made very wide, and the sheets are loosely fitted together. The caps which cover the fillets are provided with fastenings of their own, the tongues of which are seen projecting in both Figs. 1 and 2. The ridge cap or saddle is shown in a form to correspond, and in all respects the details are so clearly drawn as to make further description scarcely necessary. It will be noticed that the lower edges of the sheets are beaded, and that the gutter is connected with the same. The fastening of the gutter is also to be noted in this connection, a cleat being put in place, and the flange in the bottom of the gutter adapted to engage therewith. In all respects this drawing is worthy of careful study.

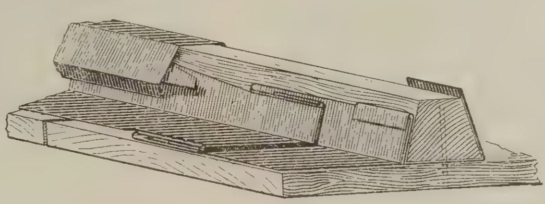


Fig. 2.—Details of Longitudinal Joint.

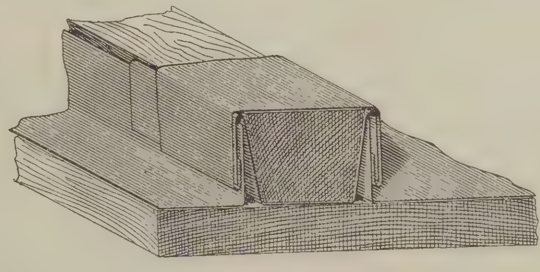


Fig. 4.—Detail of Roof Illustrated in Fig. 5.

The second style of roof, shown in Fig. 5, with details in Fig. 4, resembles the one already referred to, save that the fillet is used the other side up—that is, the small side is against the sheeting boards. Referring to Fig. 2, it will be seen that the edges of the sheets of metal are bent at an obtuse angle and lie directly against the fillet. In Fig. 4 it will be noticed that they are bent at a right angle, and at the bottom therefore stand a little way from the side of the fillet. So far as we can gain from correspondence with European mechanics, and so far as we can judge from what appears in the different publications representing both French and German practice, we incline to the idea that mechanics are pretty evenly divided as to the use of the fillets in these two ways. Some adhere to one and some to the other. It will be noticed in Fig. 5 that the construction of the roof gutter is very different from that referred to in Fig. 1.

Shape of Conductor-Pipes.

There are various styles and kinds of conductor-pipes in use. From the round pipe which every tinner makes to the corrugated pipe made by special machinery there is a wide range. Between these extremes are various rectangular forms, both plain and corrugated; octagonal-pipe, with standing seams, &c. An intelligent correspondent in Philadelphia, of an observing turn of mind, undertook, during the past winter, to determine and test the desirability of some of the leading pipes in use. He took for his field of observation the newest portion of the city—that part of the town in which enterprising builders and contractors put up from 75 to 300 houses a year each. Different builders use different makes of conductor-pipes, but the conditions under which the pipes are put up and used are about the same. This, our correspondent argues, gave him an unusual opportunity for the kind of practical test that he desired to make. None of the rows of houses that he examined have been built over two years. He informs us that he made his test after the first thaw succeeding a hard freezing spell. He took the north and south sides of the streets only. Observations were made at various times during the winter, taking 25 pipes of each kind named in the following summary on the same day. Three different tests in different parts of the city were made in this manner, making in all 75 pipes of each kind. The past winter is regarded as the hardest one for years, so far as Philadelphia is concerned, and so far as pipes are involved. Our correspondent gives the results of his observations in the form of percentages, and we feel certain that his conclusions will prove interesting to our readers, in view of the explanation above offered. The quantity of perfect pipe at the end of the season, as the results of the observations described, is represented in the following items: Plain tin and galvanized iron, square pipe, 94 per cent.; corrugated galvanized-iron pipe, square, 86½ per cent.; corrugated galvanized-iron pipe, round, 77 per cent., and plain tin and galvanized-iron pipe, round, 56 per cent. From this our correspondent argues that plain square pipe is the most durable of all in use. We lay these figures, together with the statement of how they were obtained, before our readers for their consideration.

Roof Insurance.

A roof insurance company has been organized at Portland, Ore., and is under the general management of Mr. J. C. Bayer, of that city. Agencies, we understand, are to be established in all the cities. The general scheme of the enterprise will be understood by an examination of the form of policy which has been adopted. The title of the organization is the Portland Roof Insurance Company, and the policy is as follows:

POLICY.

In consideration of..................dollars, in U. S. gold coin, to them in hand paid by the insured hereinafter named, do insure...... ....for the term of........years, against loss or damage by water, to the amount of the actual loss or damage done to building or contents, by leaks in the roofs or conductors, or caused by the accumulation of snow, ice or dirt on the roof or in conductors or conductor-heads, of the following described property... ....

The conditions of this policy are that the Portland Roof Insurance Company, for the amount of $........................to be paid them by....... .... as follows..................................agrees to give the tinwork on roof.........coats of Princess Metallic or Peerless Elastic Roof Paint, within.. ....and to make all repairs necessary to the tin work and conductors of the aforementioned building, for the term of...... years from this date, when such repairs are made necessary by the natural defects, or wear and tear of roof, or when caused by ice or snow clogging up conductors or gutters. The snow or ice we agree to remove when necessary, for the keeping of the roof from leaking. The company agrees to pay to the assured a sum sufficient to cover any loss or damage done to the above-mentioned property, or reserves the right to replace or repair such loss or damage as the assured sustains,

Provided, That the roof of said building shall be under the sole control of this company, and no one be allowed on the roof, only by the order or consent of them. No telegraph, telephone, electric light or other wires to be attached to, or run across, or come in contact with any portion of the roof or fire-walls of this building, unless by consent of this company.

Should fire occur in this or adjacent buildings, and damage the roof in any manner, or any of the boarding or wood work under the roof, so as to have to be repaired or replaced, or should the roof be flooded or injured by firemen or by falling *debris* from other buildings during or after such fire, then this contract and insurance to cease at once. Any alterations or additions to the building made during the term of this insurance may be done without invalidating this insurance,

Provided, That any repairs or alterations so made shall be done by us and under our personal supervision, and shall be done at the regular market rates for such work. Then this policy and insurance shall protect it under process and time of alteration, as at any other time. Any known defects in the roof must be reported on the issuance of this policy, or any accident happening to the roof subsequently, the company must have immediate notice given them.

Portland, Oregon,............18

....

Galvanized Iron Roofs.

From C. M., *Richmond, Hill, Ontario.*—Some eight years since I put on a galvanized-iron roof, riveting and soldering the metal together in the shop in long strips. The roof was laid flat and nailed at every inch with wire nails and well soldered. No doubt I made a mistake in laying the roof in the way described, but it is in place now, and the old mistake cannot be corrected. About every year or so I have to spend a day soldering up cracks and otherwise repairing it. I would like to know if a good coat of paint will keep it from cracking. The roof is open on all sides, and has about 1 inch fall to the foot.

Note.—Our impression is that the cracks to which our correspondent refers are caused by contraction and expansion, due to variations in temperature, and to the fact that the material is fastened in place in the way that he describes. We do not think that a coat of paint would overcome the difficulty.

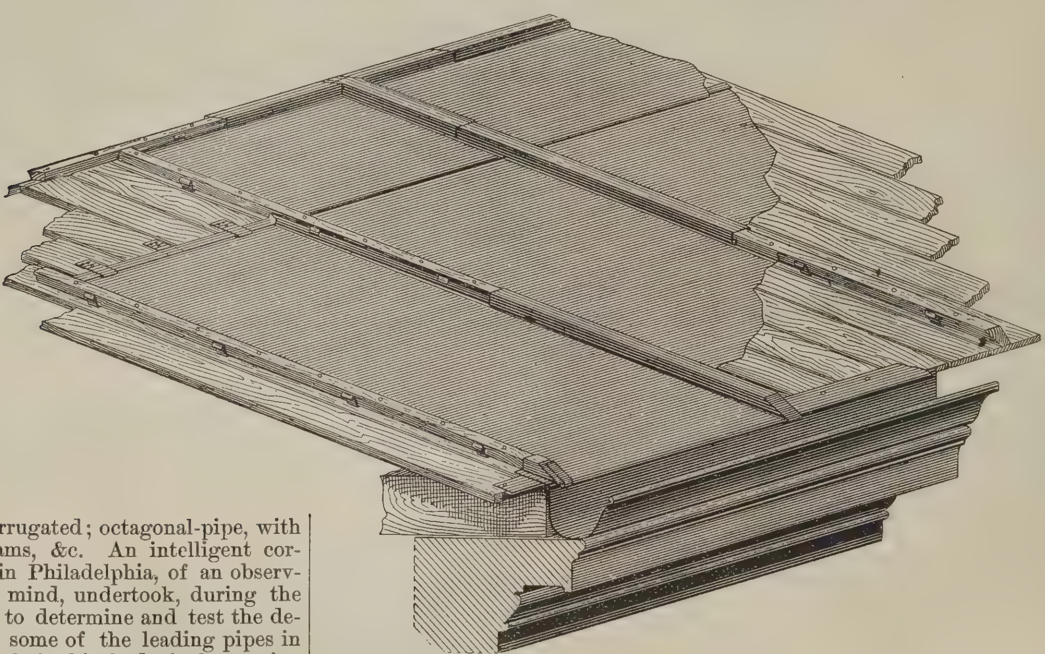
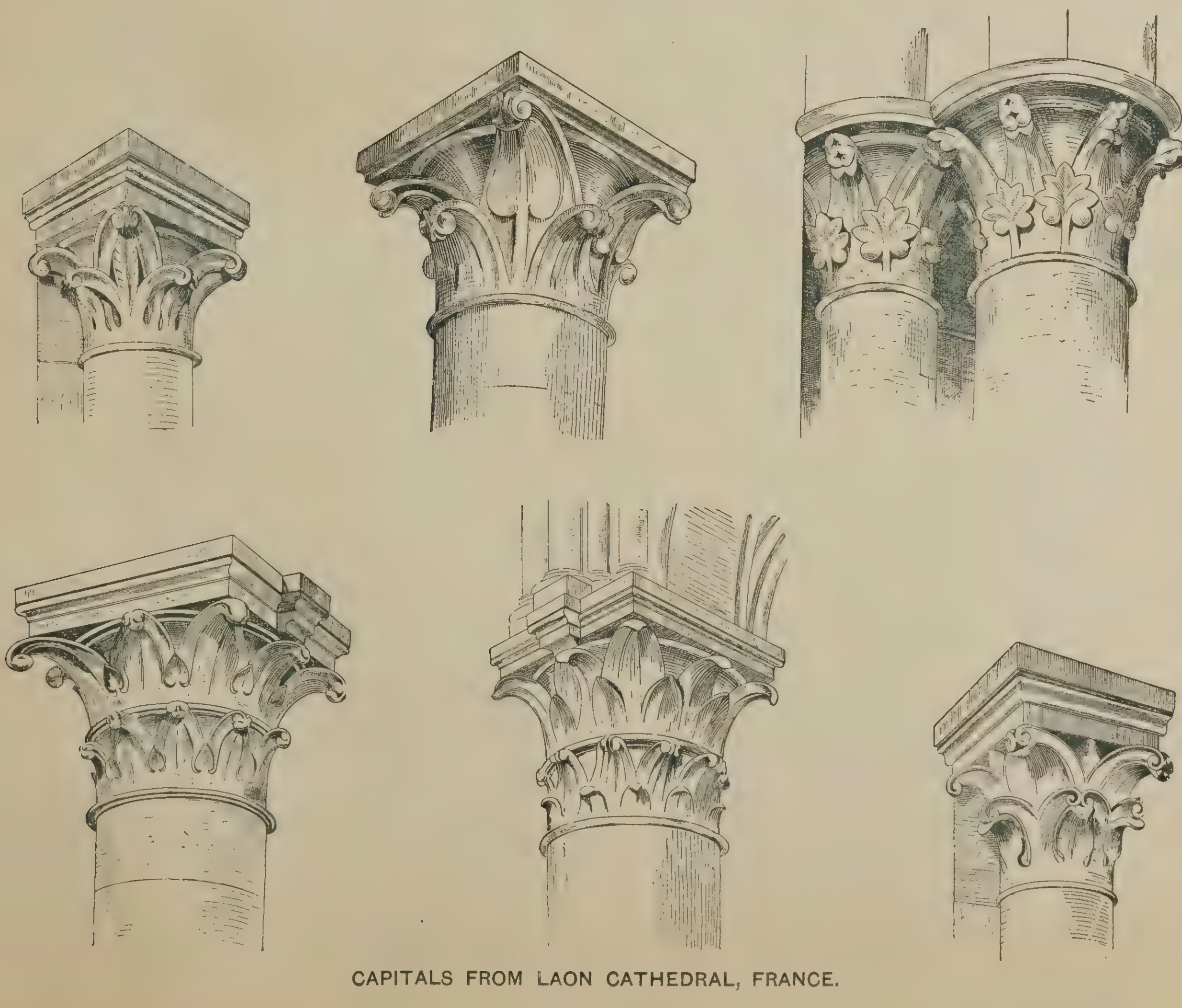


Fig. 5.—Roof Composed of Metal Plates, with Flanges Bent at Right Angles Finishing Against a Fillet, as Shown in Fig. 4.

A BLOCK OF SLATE 60 feet long, 40 feet wide and 20 feet thick, weighing some 400 tons, was moved out from its original bed by a single blast in one of the Fairhaven, Vt., quarries some time since. This is said to be the largest block of slate similarly raised in that section. Twelve holes, 20 feet deep, were drilled and common powder was used, discharged by electricity.

PERSPECTIVE VIEW OF STORY-AND-A-HALF COTTAGE. Designed by E. H. HAMMOND.

For Elevations, Plans and Details, See Text Pages.



CAPITALS FROM LAON CATHEDRAL, FRANCE.

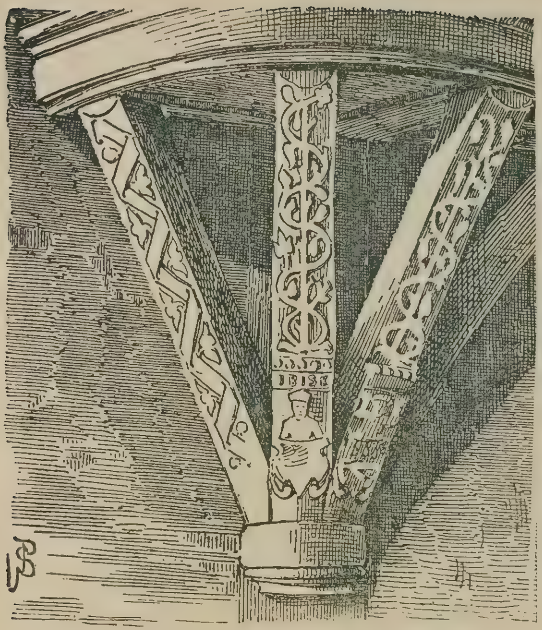
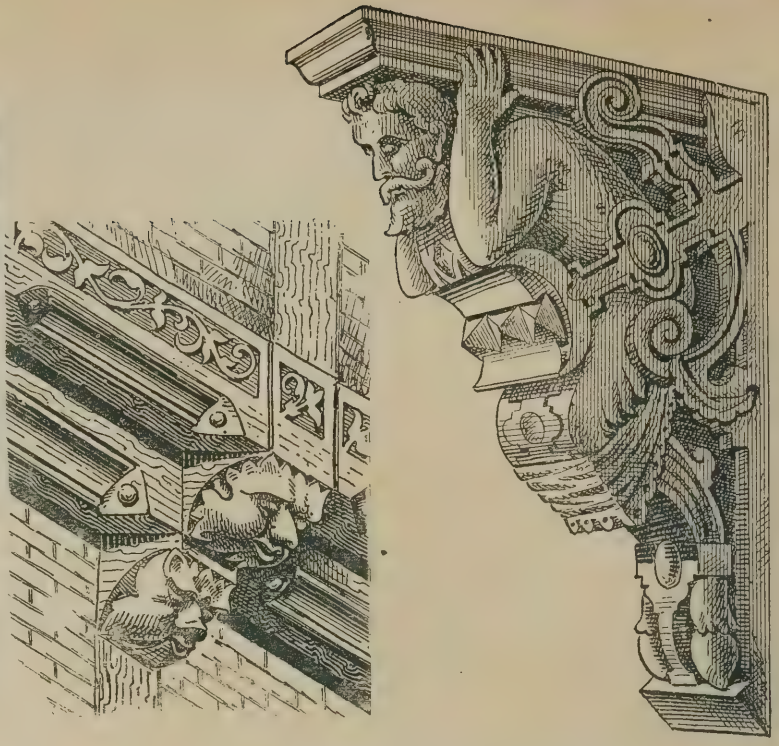


Fig. 1.—CORBEL FROM HOUSE IN PLÖTZERSTRASSE, LÜNEBURG.



Figs. 2 and 3.—TYPICAL EXAMPLES OF CORBELS ON HOUSES IN HILDESHEIM AND HALBERSTADT.

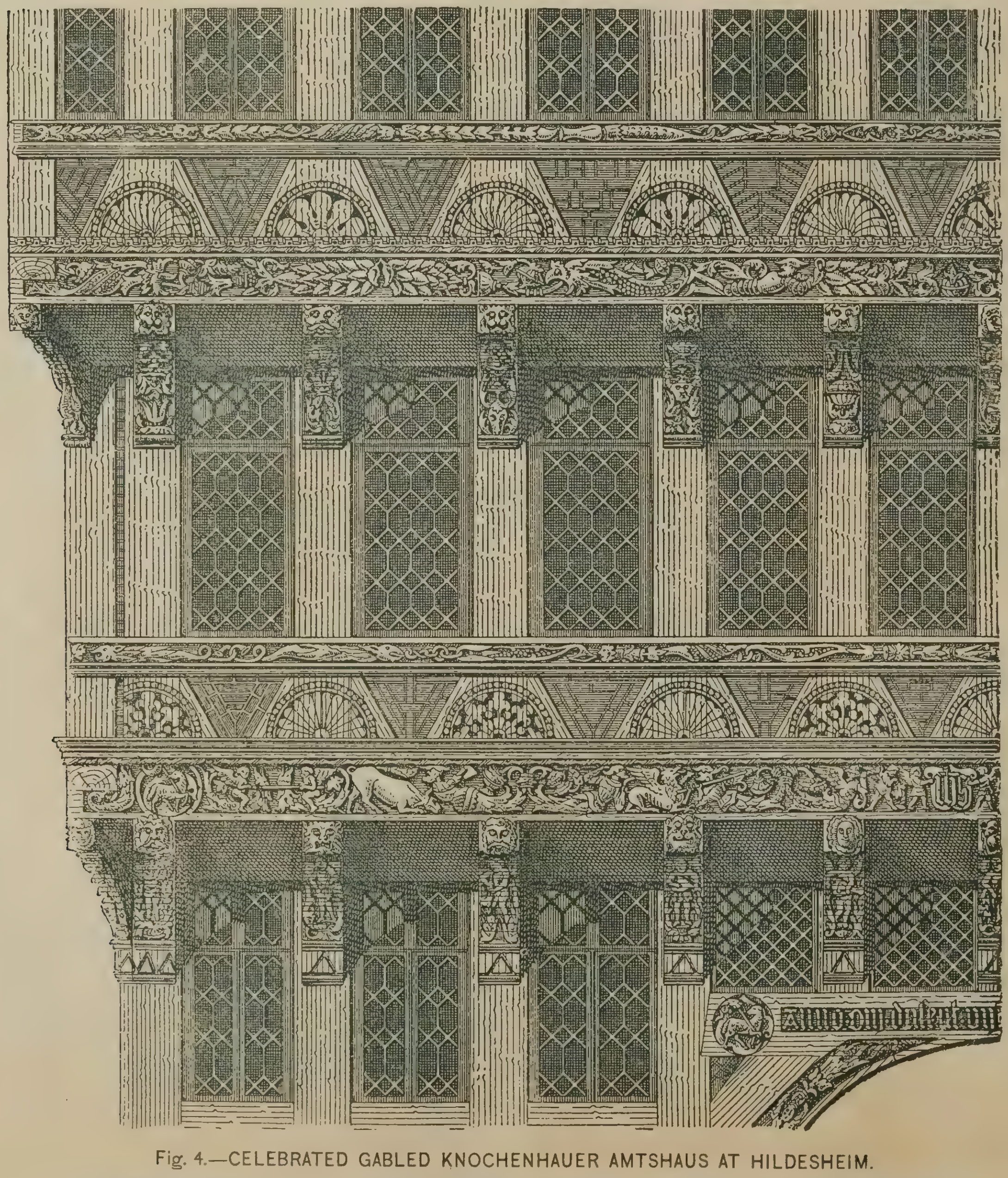


Fig. 4.—CELEBRATED GABLED KNOCHENHAUER AMTSHAUS AT HILDESHEIM.

ILLUSTRATIONS OF GERMAN RENAISSANCE TIMBER ARCHITECTURE.

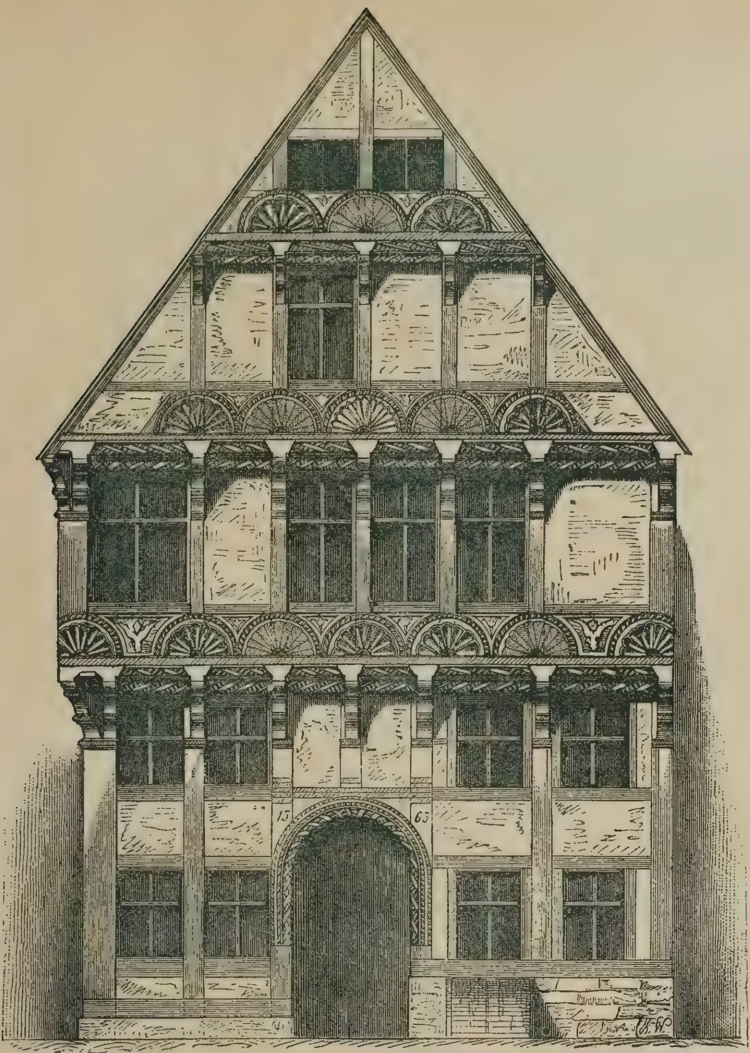


Fig. 5.—THE HÜTTE'SCHE HAUS IN HÖXTER.

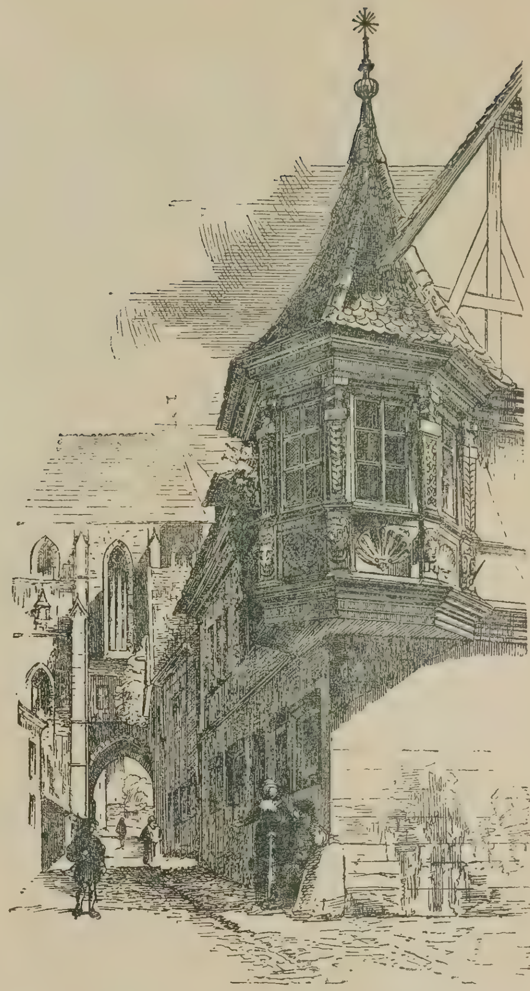
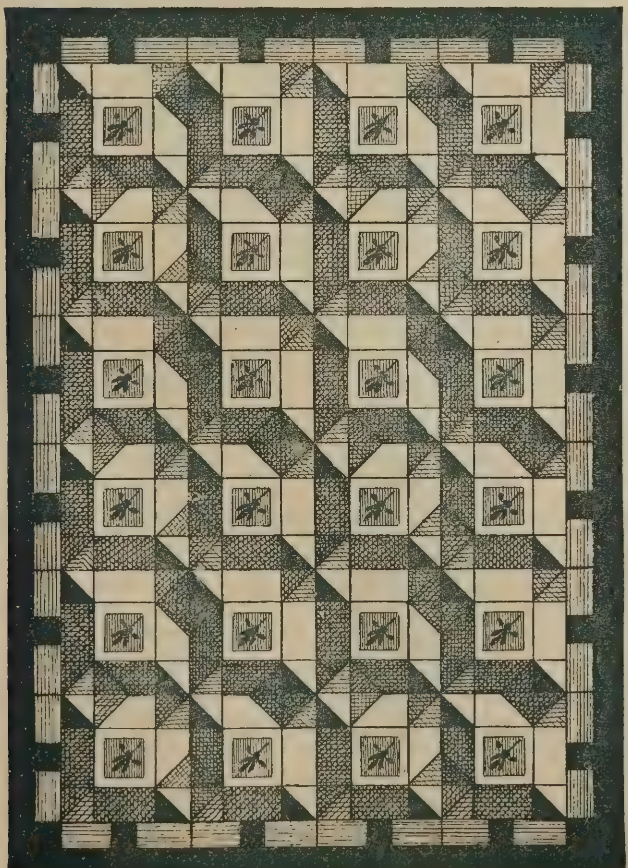
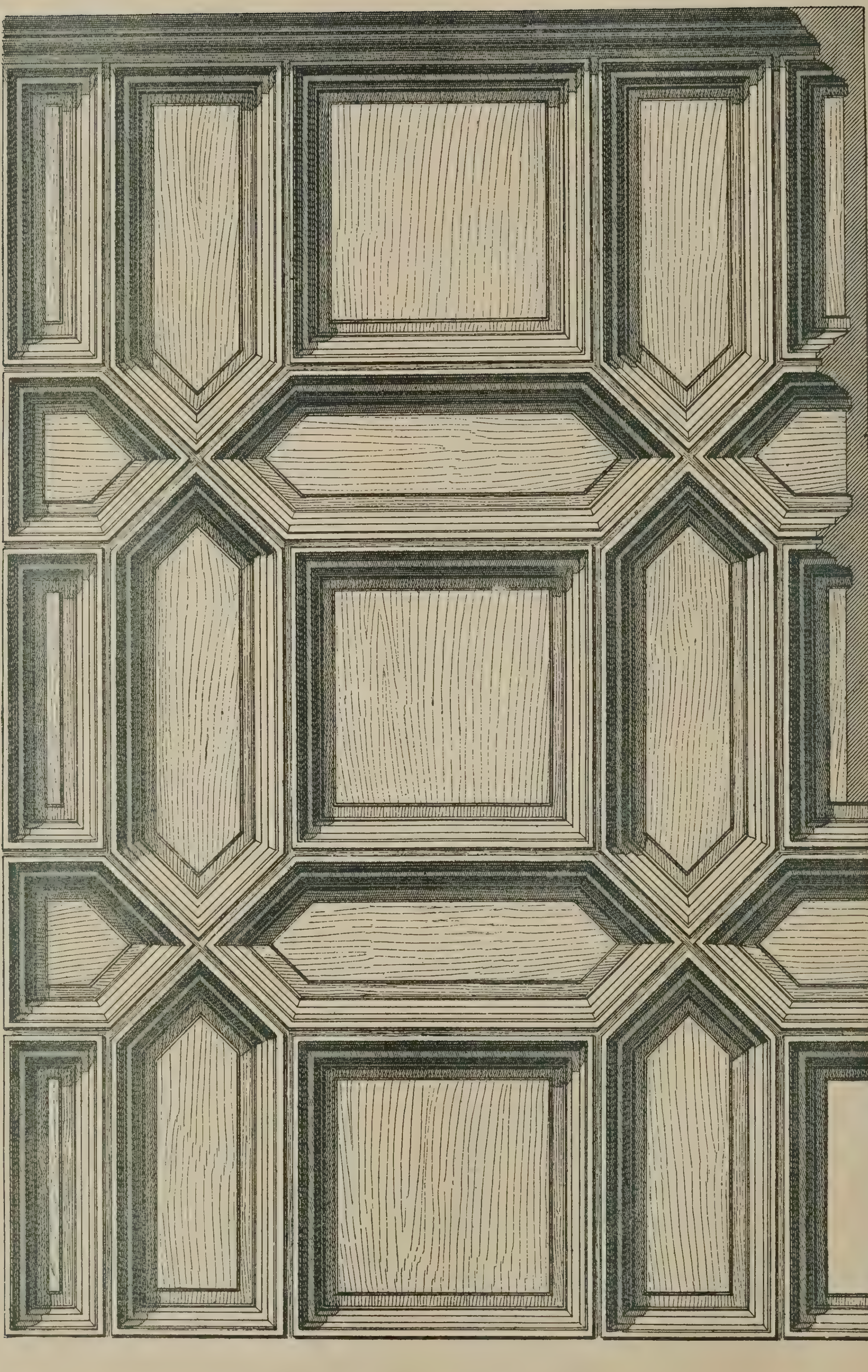


Fig. 6.—SCENE IN ROTHENBURG.



DESIGN FOR TILING. By R. FISCHINGER.

DESIGN FOR PARQUETRY. By R. FISCHINGER.



DESIGN FOR A PANELED CEILING IN WOOD.

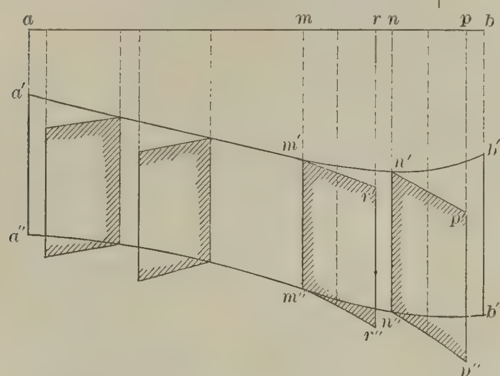
MASONRY.

Masonry and Stone Cutting.

(Continued from page 110, May.)

Development of the Soffit of the Arch (Fig. 33).—To get the development of the soffit we proceed as usual. On our plan A_2 B_2 is the trace of a right section, which we develop in $a\ m\ r\ n\ p\ b$. This serves as a base line to measure the distances of every point of the developed curves of penetration.

Bed Molds.—To get the molds of the bed-joints we turn them down by making



Masonry and Stone Cutting.—Fig. 33.—Development of the Soffit of the Arch.

$m\ r = M\ R$ and measuring off the distances $r\ r'$, $r\ r''$, as well as points on intermediate lines. In this mould $m'\ r'$ is a conic section (ellipsis, parabola, hyperbola), whereas $m''\ r''$ is the arc of a circle. The tangents to the curve $m'\ r'$ are the intersections of the plane of the bed-joint with the planes tangent to the cone. The radius of the arc $m''\ r''$ is found by measuring the

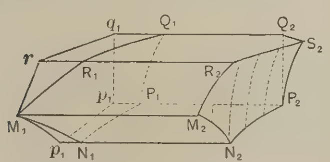


Fig. 34.—Dressing the Voussoirs.

distance $\omega\ \gamma$ from the center of the cupola to the plane of the bed-joint prolonged; carrying that distance to γ on the plan, $\gamma\ \theta$ will be the radius required.

Dressing of the Voussoirs (Fig. 34).—As in the former problem (Fig. 15), we begin by working a prism of stone, the section of which is the pentagon M N P Q R on our elevation. Then, on the plane of the bed-joint M_1, we place the mold $m'\ m''\ r''\ r'$ (Fig. 33), and we draw on the stone the outline $M_1\ M_2\ R_2\ R_1$ of the bed-joint (Fig. 34). On the upper face we place a mold identical to the polygon R′ R″ S″ P″ Q′ on plan (Fig. 30). For the vertical joint we have the mold Fig. 31, and guided by the lines $P_2\ Q_2$ and $Q_2\ S_2$ we can work the short plane which finishes this vertical joint. After this we place thereon the mold Fig. 32. We get the lower bed as we get the upper one, and on the cylindrical soffit we place a flexible mold $m'\ m''\ n''\ n'$ of the developed soffit (Fig. 33).

This done, every arris of the voussoir has been delineated. The spherical surface is then cut with a templet, used in the direction of the meridian planes on the sphere. For this purpose guiding points are obtained by drawing on plan radii ω', intersecting the spherical head of the voussoir. As for the head on the outside face of the tower, it is a conical surface, which can be cut with the help of a straight-edge, used in the direction of the generators of the cone. On plan the generators of the cone radiate also from ω'.

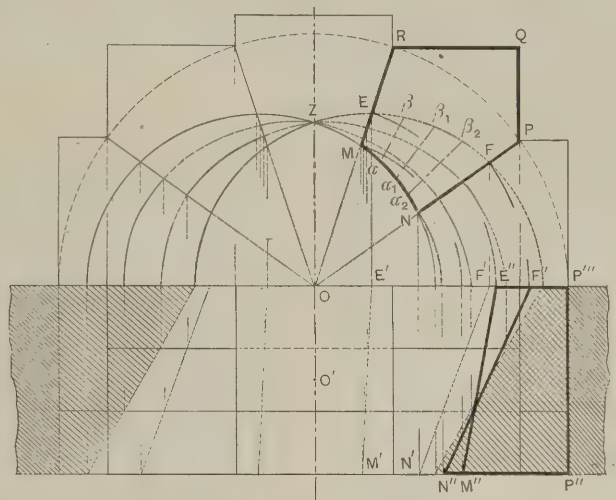


Fig. 36.—Another Ancient Solution of this Problem.

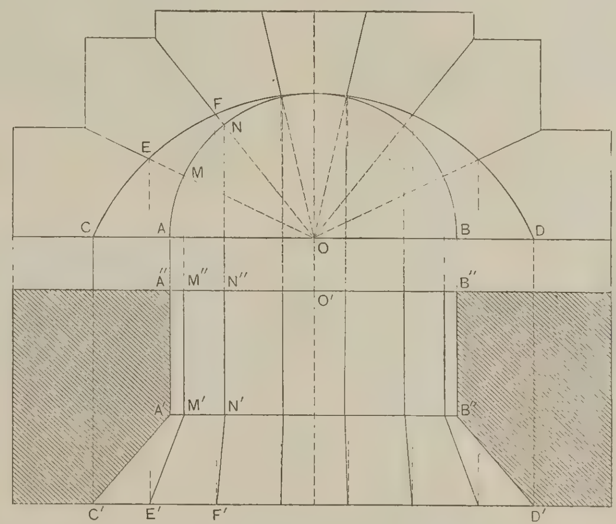


Fig. 37.—The "Cow's Horn" Arch in Ancient Architecture.

We beg to notice that it would be desirable to leave on the upper edge $R_2\ S_2$ of the voussoir a short surface normal to the sphere; this would form a conic zone like the bed joints of the cupola (Fig. 22).

To Construct an Oblique Arch.—As the axis of the arch is skew, if the bed joints were made as usual, the thrust of the arch would find no abutment; for the thrust, which in that case is perpendicular to the axis of the vault, would not be also in the direction of the wall as in right arches. Modern engineers have surmounted this difficulty by constructing oblique arches with spiral bed joints, a system of construction we shall study later on. For the present we shall consider how this problem was solved by ancient masons, as it will introduce us to a kind of arch useful in other structures besides oblique arches.

In Fig. 35 we show one solution. The wall has its two faces parallel; the arch has also its jambs parallel, but not perpendicular to the face of the wall. On the front and back of the wall we draw the semicircular openings of the arch, and the soffit of the archway is then formed in shape of a cylinder engendered by a horizontal straight line guided by the two outlines of the arch on the wall faces. On

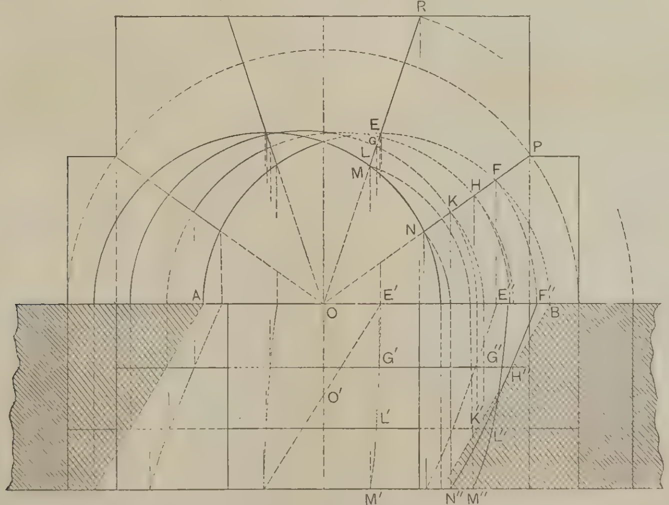


Fig. 35.—Ancient Method of Constructing an Oblique Arch.

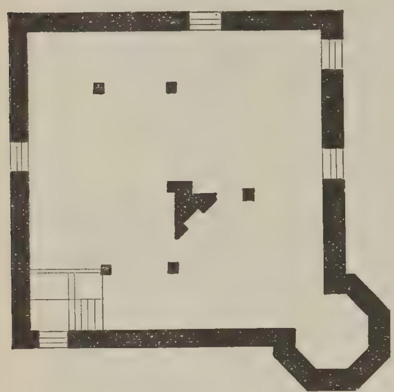
the center O′ of the oblique cylinder we produce a line, O O′, perpendicular to the face of the wall, and drawing a circle from the center O, we divide the voussoirs of the arch as if it were an ordinary arch with O O′ as axis. By this construction the thrust of the arch will be in the direction of the wall; but, on the other hand, the beds will not be normal to the soffit of the arch—a defect which should be avoided, if possible.

As the bed-joints cut the cylindrical soffit obliquely, the arrises of the beds will be portions of ellipses. The projection of these arrises will be found on plan by making auxiliary sections of the cylinder by planes parallel to the faces of the wall.

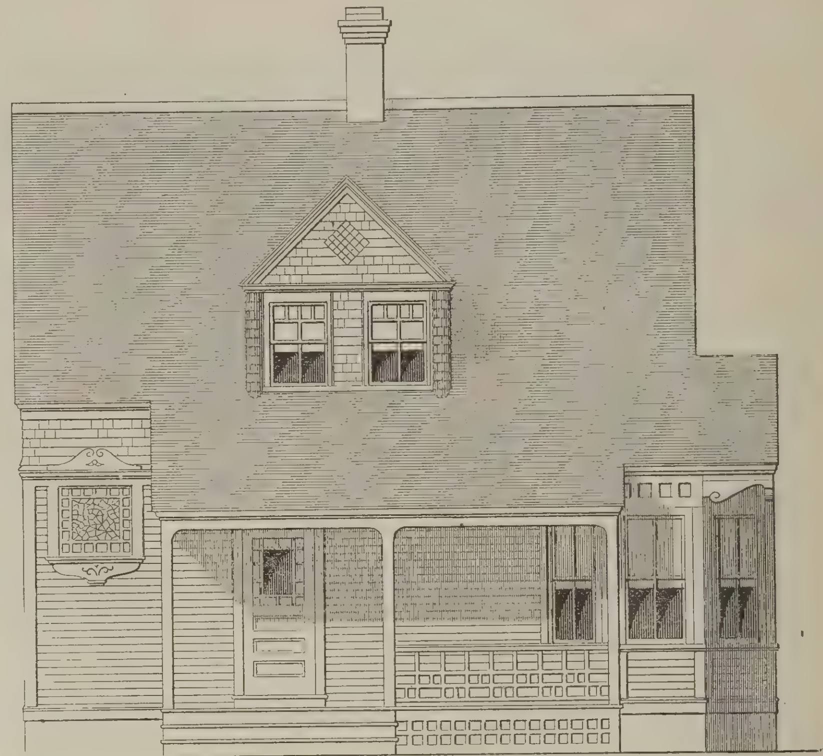
To find the molds of the bed-joints M R and N P, we turn down the planes of these joints round their trace, the line O O′. This is how we have obtained the curves M″, L″, G″, E″, and N″, K″, H″, F″.

The flat faces of the stones are cut in the ordinary way, and the outlines of the bed-joints and head-faces marked thereon. For the cylindrical soffit of the stone, the straight-edge will have to be kept parallel to the plane of the plan—that is, horizontal. To obtain this result, guiding points will have to be marked on the arrises of the stone; these are easily obtained on the elevation by lines parallel to A B.

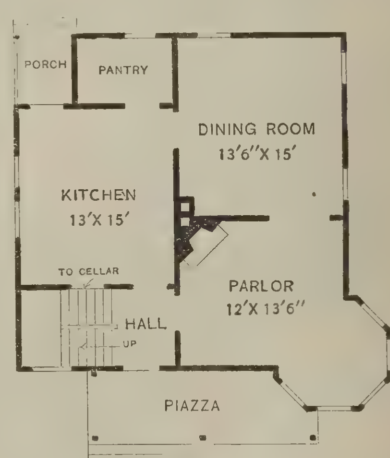
In Fig. 36 we give another ancient solution to this problem, wherein the soffit is no more a cylinder, but a particular skew surface, called by the French masons a cow's horn. It is engendered as follows: Through the point O′ center of the parallelogram formed by the plan of the arch we produce the line O O′ perpendicular to the face of the wall, and then we let the soffit of the arch be generated by a straight line bound to remain in contact with both the semicircular openings and the line O O′. The soffit of the arch is therefore a skew surface. The projections of any generator of that surface are easily determined; on the elevation they radiate from the point O, and from the points such as M and E, where they cut the openings of the arch it is easy to obtain the plan M′ E′ of the generator. In the point Z the generator of the soffit will be horizontal, which can be interpreted as meeting the



Foundation Plan.—Scale, 1-16 Inch to the Foot.

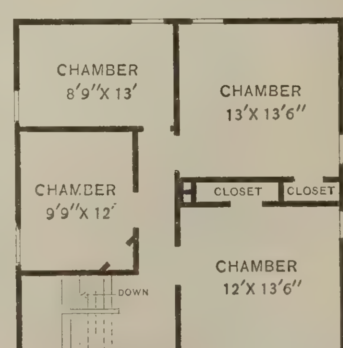


Story and a Half Frame House.—Front Elevation.—Scale, ⅛ Inch to the Foot.



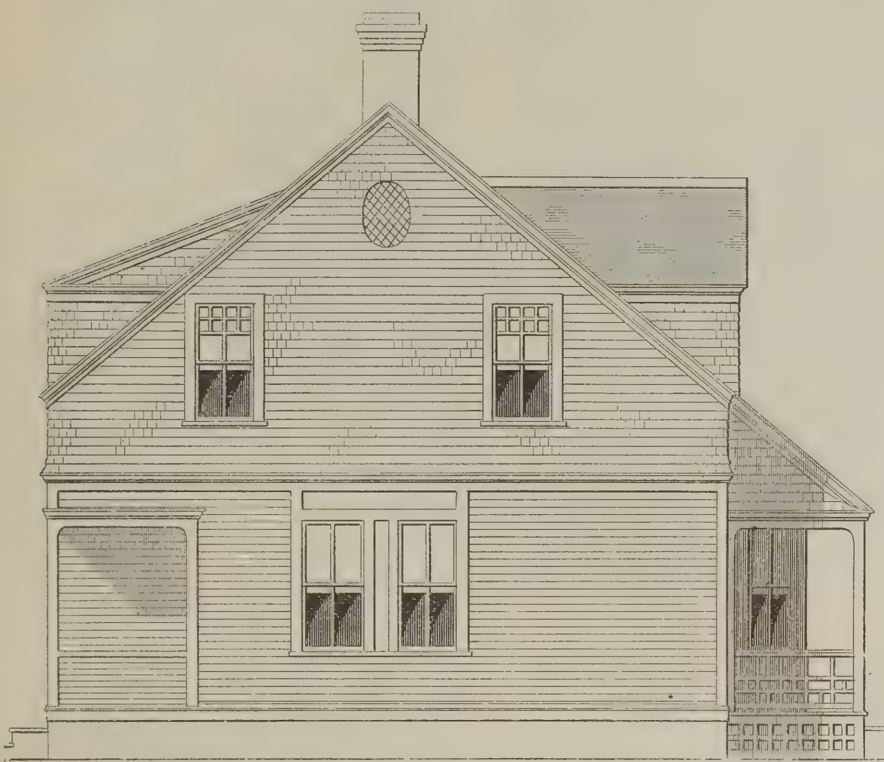
First Floor Plan.—Scale, 1-16 Inch to the Foot.

Rear Elevation.—Scale, ⅛ Inch to the Foot.



Second Floor Plan.—Scale, 1-16 Inch to the Foot.

directing line O O′ at an infinite distance. The bed-joints of the arch are then taken through the line O O′ as in the former construction; but their arrises are straight lines instead of being curved, and the guiding points $a\ \beta$, $a'\ \beta'$, &c., for working



Side Elevation—Left.—Scale, ⅛ Inch to the Foot.

the soffit of the voussoir are more easily found, which constitutes a practical advantage over the former oblique arch. On the other hand, the bed-joints are not normal to the soffit of the arch, and therein this ancient method of construction is inferior to our modern ones by spiral courses. To find the bed-molds we turn down the planes of the bed round the axis O O′. The inner arrises of the mold are E″ M″ and F″ N″, and the outer ones are both P″ P″.

A practical application of this Cow's Horn arch is to be found in some arches (Fig. 37) used in Paris bridges, the Pont de Neuilly and the Pont Neuf, to allow of a freer flow when the stream is exceptionally high. We have also found it used in the Jura mountain districts on a smaller scale in the arched doorways of barns, to allow carts loaded with hay to slip through without impediment. The Fig. 37 sufficiently explains this kind of arch; but we may add that the two guiding curves may be made of any shape which suits our purpose best. In the Neuilly Bridge, for instance, they are both elliptical.

Wood, Plaster and Concrete.

A short time since, the editor of the London *Building News*, discussing wood, plaster and concrete, said:

The respective merits of these materials in the construction of buildings have recently been reviewed in their relation to the acoustics of theaters, and the general gist of opinion is that concrete has proved a success. It is obviously difficult to compare two materials like wood and concrete, so different in their physical properties. But for the inflammable nature of wood, it must be admitted to be the most desirable acoustically for the lining of rooms and halls adapted for music. The Italian Congress of Architects in 1880 laid down certain rules respecting the form and materials desirable for halls of music and theaters, one of which was that wood was the proper material to augment the energy of sound, and giving preference to fir; they also recommended that the room should be lined with wood, isolated as much as possible from the fabric of the building; that the soffit of the theater (ceiling) and the fronts of boxes should have their surfaces composed of thin planks fitted together like boxes, and the columns should be of wood, also hollow.

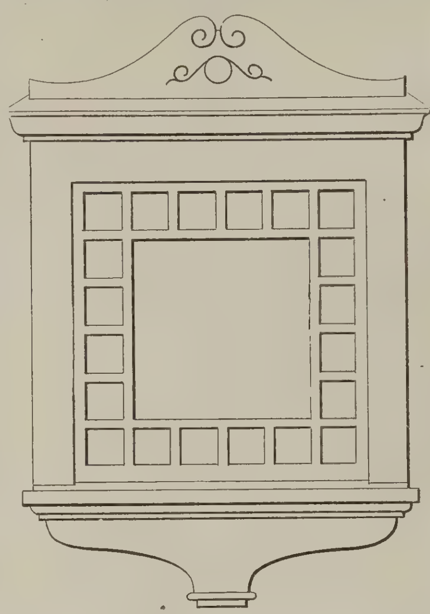
Side Elevation—Right.—Scale, ⅛ Inch to the Foot.

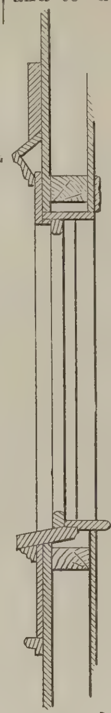
These recommendations, obviously intended to promote resonance, are opposed to all our ideas of incombustibility, and, in fact, would promote the spread of flames. No better prescription for an inflammable interior could be given than that the hall should be lined with wood isolated, and that the boxes should be separate boxes of wood. Her Majesty's Opera House, destroyed by fire in 1867, was entirely of wood lining forming resonant surfaces, fixed to the walls at as few points as possible so as to yield to the vibrating mass of air, and this construction has more or less prevailed.

From acoustic considerations, then, wood is preferable to all other materials as a wall lining, but its inflammable nature renders it undesirable in the construction of the auditorium of a theater. For the reinforcement of sound it stands foremost; in other respects its presence adds materially to the risks of fire. The employment of plaster or cement is undoubtedly inferior as an acoustic surface; it has none of the vibrating properties of wood; the sound-waves recoil and produce confused sounds. On the other hand, it has a protective value which renders it desrable for ceilings, the covering of columns and gallery fronts, and the patent plasters which are employed are easily and cheaply applied. Of late years the introduction of box divisions of concrete slabs, as employed by Mr. Tavenor Perry at the Alhambra, and a system of partition construction of angle iron and wire netting plastered, have superseded wood. These materials are less resonant and vibrating, but when they are employed in halls and theaters of moderate dimensions no acoustic objections have been discovered. Concrete is a material, above all others, that must take the place of wood in large halls and auditoriums; slabs of concrete can be made of sufficient resonance to aid the sound instead of absorbing or reflecting the waves, and a thin shell of the same material or of fireproof plaster is the best kind of ceiling. Mr. Wm. White, F. S. A., referred the other day at the Institute to the acoustic value of fibrous plaster and concrete. Where the stage was made of concrete it gave back a sharper sound than boarding—an experience that was borne out by Mr. Robert Walker, who had used concrete in the Kensington Town Hall and instanced the use of it at Terry's Theater and the Alhambra. Similar evidence of the value of

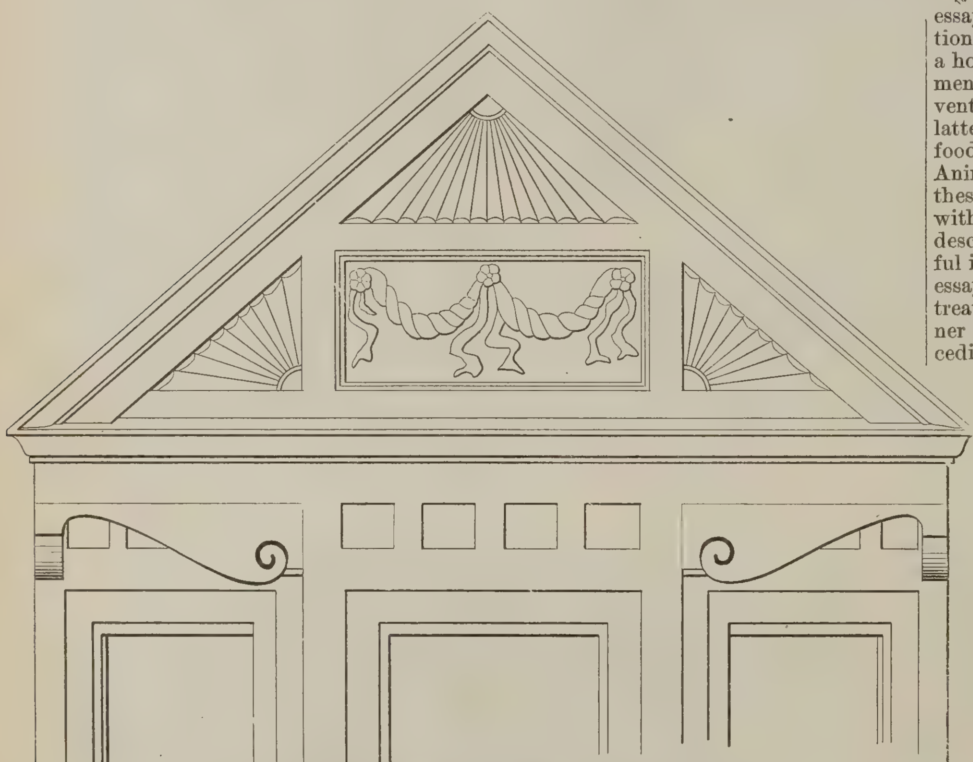
plaster has been given by Mr. Ralph Nevill, who states that plaster gives the "clearest and most rapid resonance." Taking, then, the relative advantages of each material for interior linings of such buildings as we have considered, concrete has merits which cannot be disputed. There is a quick resonance, less full and sonorous than wood, but still sufficient to aid the voice when the conformation of the hall or auditorium is favorable, while it is absolutely indestructible by fire if properly made.

For flooring purposes the adoption of a fire-proof floor of concrete or of flat brick, like that of Homan and Rodgers, does not necessarily imply the desirability of a hard surface; wooden floor boarding can be used. One merit of wood we have omitted--namely, its warmth and comfortable appearance, a quality which we estimate at its true value in a domestic apartment, but not in a public hall. Wooden linings and wainscoted walls will always be esteemed by the architect. The claims of its rivals, plaster and concrete, become strong only when we have to consider other qualities, such as cleanliness, durability and fire resistance. Interior surfaces should be adapted to the purpose of the building, and if this test is invariably applied fewer mistakes are likely to be made. We do not mean to say that concrete has any strong artistic claim in its favor; there is room for adapting it for internal surfaces and partitions; but as it can be built up *in situ* or used in slabs it admits of architectural treatment in a manner that gives it some preference over stone or even wood.

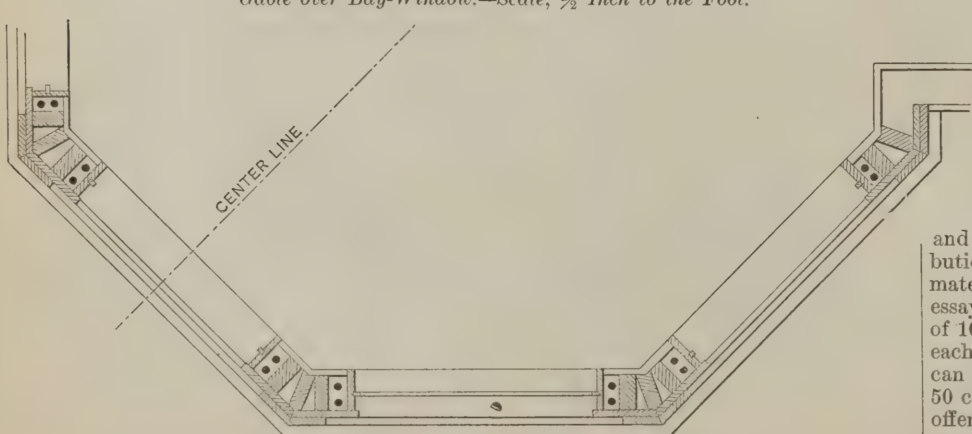




Window in Front Hall.—Scale, ½ in. to Foot.



Gable over Bay-Window.—Scale, ½ Inch to the Foot.



Half Plan of Bay-Window.—Scale, ½ Inch to the Foot.

The three materials we have named will continue to enlist the sympathies of architects. It is for them to consider the merits of each for its particular purpose, and to decide which is most capable of fulfilling the object the best.

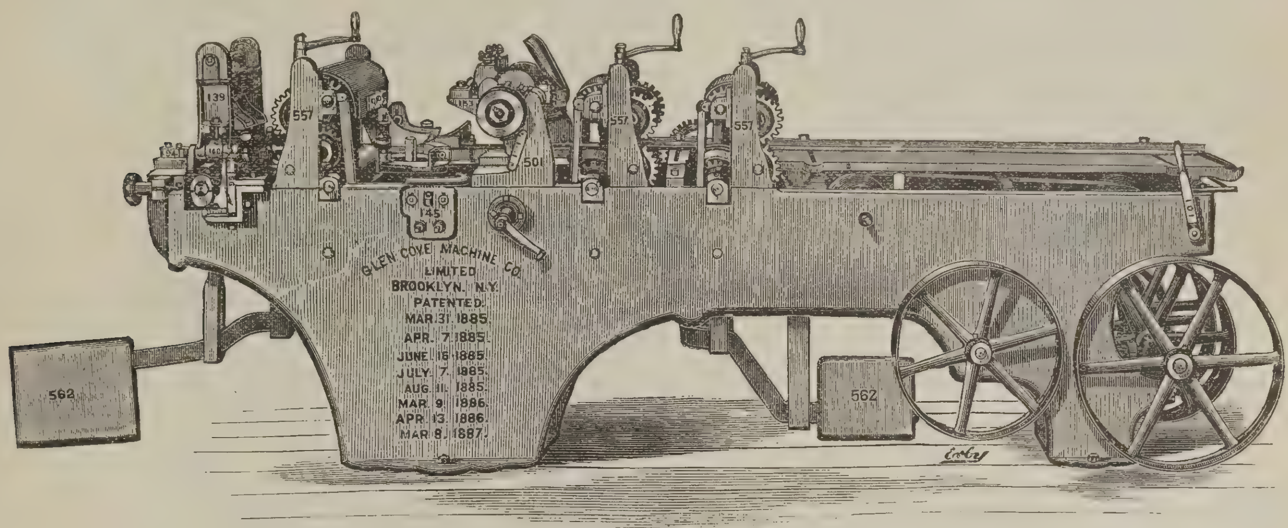
The Lomb Prize Essays.

We have received from Mr. Irving A. Watson, of Concord, N. H., who is secretary of the American Public Health Association, a set of the Lomb Prize Essays, published by the above mentioned association. The essays are bound in pamphlet form and are entitled as follows: No. 1, "Healthy Homes and Foods for the Working Classes," by Victor C. Vaughan, M.D. No. 2, "The Sanitary Conditions and Necessities of Schoolhouses and School Life," by D. F. Lincoln. No. 3, "Disinfection and Individual Prophylaxis Against Infectious Diseases," by George M. Sternberg, M.D. No. 4, "The Preventable Causes of Disease, Injury and Death in American Manufactories and Workshops and the Best Means and Appliances for Preventing and Avoiding them," by George H. Ireland. In the first of these essays the writer makes valuable suggestions concerning the selection of a site for a home, and then deals with the arrangement of the rooms, water supply, heating, ventilation, and similar matters. The latter part of the book is devoted to foods, subdivided under the headings of Animal Foods and Vegetable Foods. In these chapters all the ordinary foods met with are commented upon, and analytical description given of them and much useful information supplied. In the second essay the question of schoolhouses is treated somewhat in the same general manner as that of dwelling houses in the preceding essay. Of course the conditions of a home and of a schoolhouse are quite different, and the author has necessarily gone more fully into the questions of ventilation, light, &c., than he would if writing about a residence. In the essay on disinfection the subject is first treated of in a general way, the major portion of the publication being given to descriptions of the several disinfectants in common use, with their special applications, and also the common contagious diseases are referred to and the best disinfectants to be used in connection with them noticed. The contents of the fourth essay on diseases and injury in work shop and their prevention is generally described in the full title given above. All the common safety appliances, such as elevators, fire escapes, &c., are referred to, and considerable attention is given to plumbing, ventilation, heating, lighting, &c. From the circular accompanying these essays we learn that it is the desire of the American Health Association to bring them to the attention of the public, and we have no doubt that a wide distribution of the pamphlets would be to the material benefit of many people. The essays may be had separately at the price of 10 cents for the first one and 5 cents each for the remaining ones, or else they can be had in one cloth-bound volume for 50 cents. Prizes of $500 and $200 are offered by Mr. Lomb through the American Public Health Association for the two best essays on "Practical, Sanitary and Economic Cooking, Adapted to Persons of Moderate and Small Means." They must be sent to Dr. Watson, the secretary, on or before September 15, 1888, with the writers name in a sealed envelope.

NOVELTIES.

Fast-Feed Flooring and Ceiling Machine.

The engraving shown in Fig. 1 illustrates the new No 4 fast-feed flooring and ceiling machine constructed by the Glen Cove Machine Company, of Brooklyn, N. Y. It is especially designed for flooring and ceiling and similar work, and is described as a light running, rapid and very satisfactory machine. Each machine will match to its full rated width and will plane up to 4 inches thick. The frame is heavy and every joint is planed and solidly fitted together. All the shafting is of steel. The top and bottom heads are each forged, with their journals, from a solid piece of steel, and are slotted on all four sides. All gears are cast from iron cut patterns. The machine is fitted with all the special improvements of this company—viz., variable feed, weighted chip-breaker, new hoisting work, parallel raising of the rolls, revolving the expansion gear shafts in boxes, so that they can be easily oiled; side head presser bars, adjustable oil steps for side spindles, with ring attachment to secure cool and steady running; gripping device to side head frames, set works to top and side heads, improved expansion gears, yoking the cutter-head boxes together to prevent their getting out of line. Every part or piece of the machine is numbered. all shafts and fittings, including bolts, nuts and screws, are finished to United States standard sizes. The machine is substantially built in two sizes, 14 and 24 inches wide, weighing respectively 6000 and 6800 pounds.



Novelties.—Fig. 1.—Flooring and Ceiling Machine, Made by the Glen Cove Machine Company, Brooklyn, N. Y.

No. 1 Combination Saw Table.

We present in Fig. 2 of the illustrations a general view of No. 1 combination saw table, which is being offered to the trade by Cordesman, Meyer & Co., 186 and 188 West Second street, Cincinnati, Ohio. The machine is generally described as a useful and desirable tool, which should be in every wood-working establishment. The frame proper and extension pulley shown in the cut which carries the countershaft are cast in one piece, the advantage being that it simplifies the work of setting up the machine, and also keeps the countershaft and mandrel always in line with each other. The distance between the countershaft and mandrel is such that all danger of the belt slipping is avoided, even, it is stated, when doing quite heavy work. A saw guard will be noticed at the front of the frame, which is provided to prevent danger from the saw when reaching below the table. The mandrel is described as being made of fine quality of steel, turned perfectly true and balanced with pulleys in the center between the boxes. The bearings are long and lined with babbitt metal. The hand wheel shown in the front of the machine is for raising and lowering the mandrel, so that the belt is always kept tight. The smaller hand-

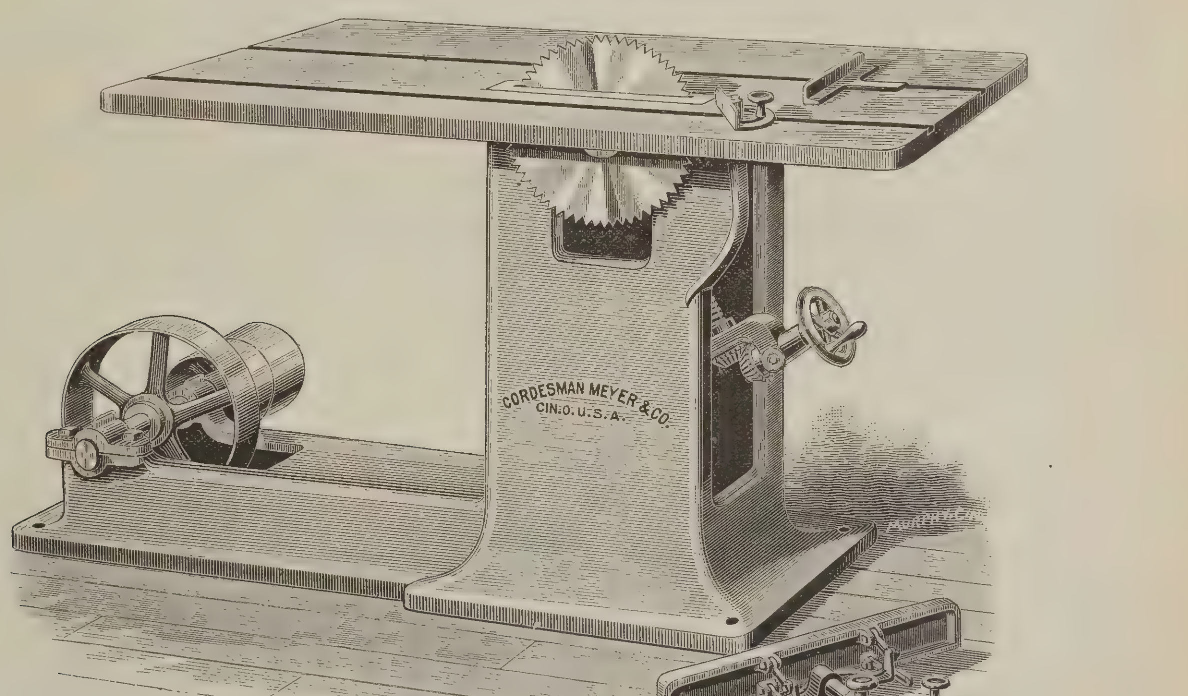
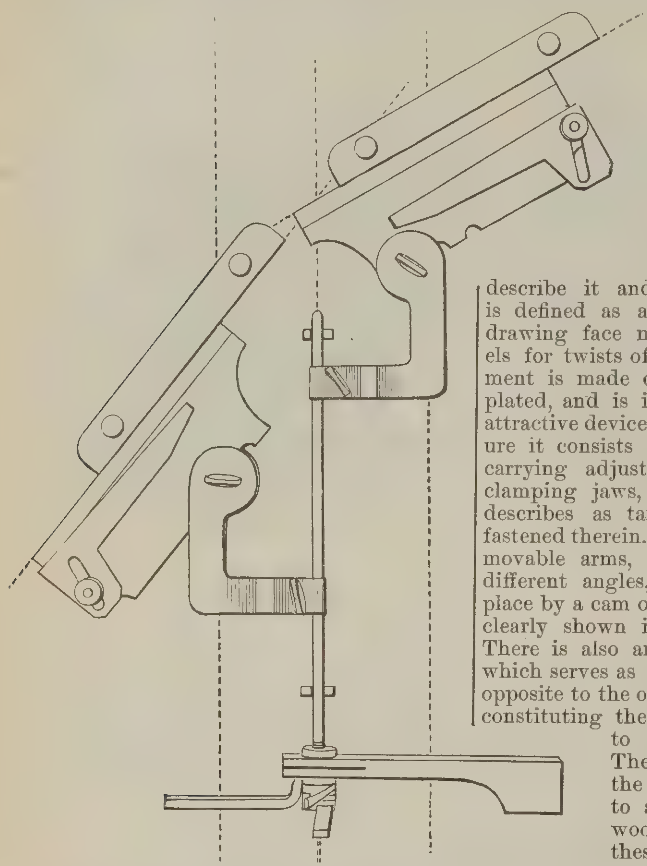


Fig. 2.—Combination Saw Table, Made by Cordesman, Meyer, & Co., Cincinnati, Ohio.

wheel locks the mandrel in position when used for grooving, &c. The table, which is iron, is 4 feet 3 inches long and 2 feet 9 inches wide, and has a plain groove each side of and parallel with the saw for gauges for sliding table. The opening in the table filled with a wooden piece is 2 inches wide, so that more than one saw or any style of head up to that limit of width can be used. The manufacturers direct special attention to the adjustable ripping gauge or fence furnished with this machine. They state that it can be set at any angle and is so constructed that its face is always perfectly straight and true. In addition to this attachment they furnish one miter fence, one rigid cross-cutting fence, one 16-inch cross-cutting saw, and one 16-inch rip-saw and complete countershaft. They will also furnish, at slightly extra cost, a boring attachment that can be raised and lowered and has a sliding table with adjustable fence. It is attached to the side of the frame opposite the saw.



Novelties.—Fig. 3.—The Tangentograph in Position on the Elevation Taking the Angles of Tangents, the Base Having been Previously Set to the Angles of the Tangents of the Plan.

The Tangentograph.

Henry C. Root, of 196 West Houston street, New York, has devised a tool useful in the hands of stair-builders and adapted to do much of the work that is at present accomplished by drawing, which he has named the "Tangentograph." It is shown in use in several different positions in Figs. 3 to 6 of the engravings. In the brief space at our command we will undertake to describe it and illustrate its use. It is defined as an instrument adapted to drawing face molds and obtaining bevels for twists of hand rails. The instrument is made of brass and steel, nickel plated, and is in all respects a neat and attractive device. In its mechanical structure it consists of a center circular post, carrying adjustable upward projecting clamping jaws, with what the inventor describes as tangent blades and bevels fastened therein. The base consists of the movable arms, adapted to be placed at different angles, and locked securely in place by a cam or eccentric lever. This is clearly shown in both Figs. 3 and 4. There is also an auxiliary base of wood which serves as a support in any direction opposite to the other arms referred to, thus constituting the device a tripod, adapted to stand wherever desired. The tangent blades held by the clamps already referred to are thin pieces of hard wood. On one end of each of these is fastened, by what may be described as a pivoted screw and nut, a metallic blade, which the inventor terms the twist bevel. When these blades are at rest they lie flat against the tangent blades, as shown in Figs. 3 and 5. When, in turn, they are extended for use—that is, at right angles to the tangent blades—they appear as shown in Figs. 4 and 6. The several engravings show the uses to which this instrument may be applied. Fig. 3 shows it in position on the elevation, taking the angles of tangents. Before being placed in this position the base has been set on the plan and the two metal arms of the base set to the angle of the plan tangents. The instrument is then spread

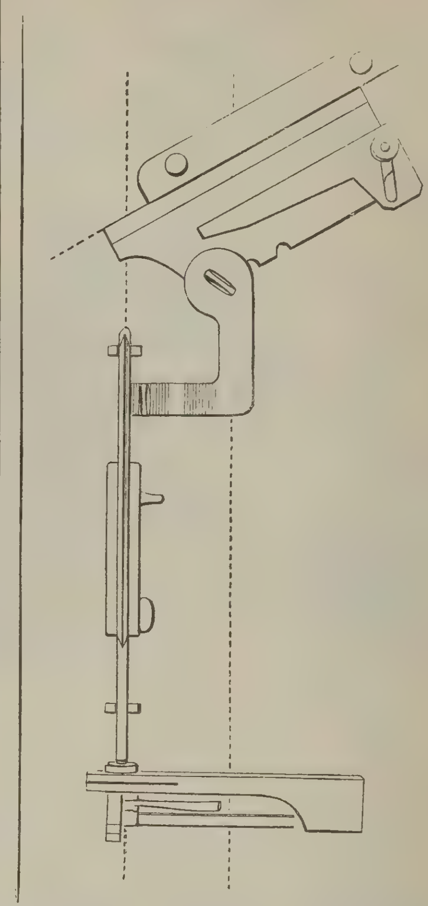


Fig. 5.—The Tangentograph with Tangent Blades Revolved into the Plan of the Base.

as shown in Fig. 4, stops being fastened against the drafting board agreeing with the tangent lines. Then the tangent

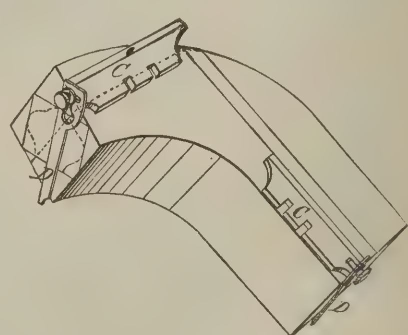


Fig. 6.—Application of the Bevels.

blades are brought to position, as shown, and the different screws turned to fasten the parts. This done, the instrument with the tangent blades is revolved into the plan of the base, as shown in Fig. 5.

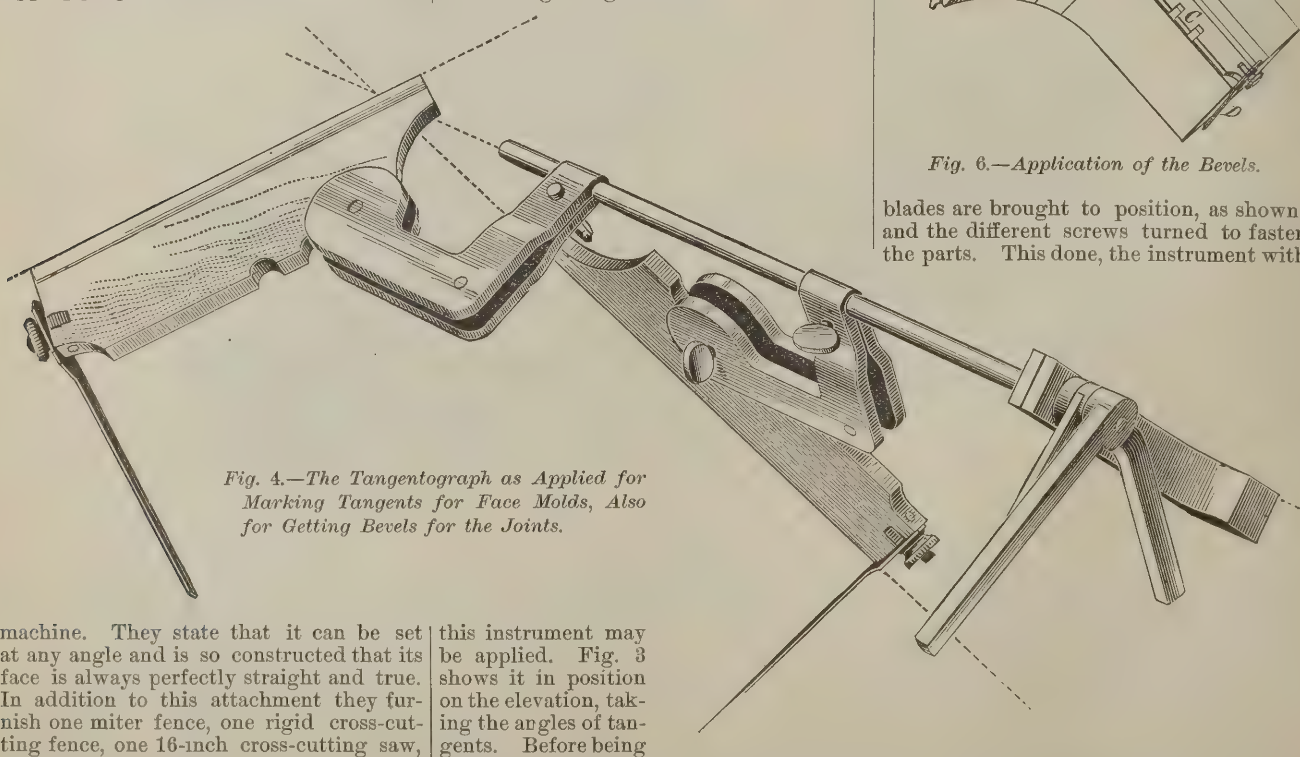
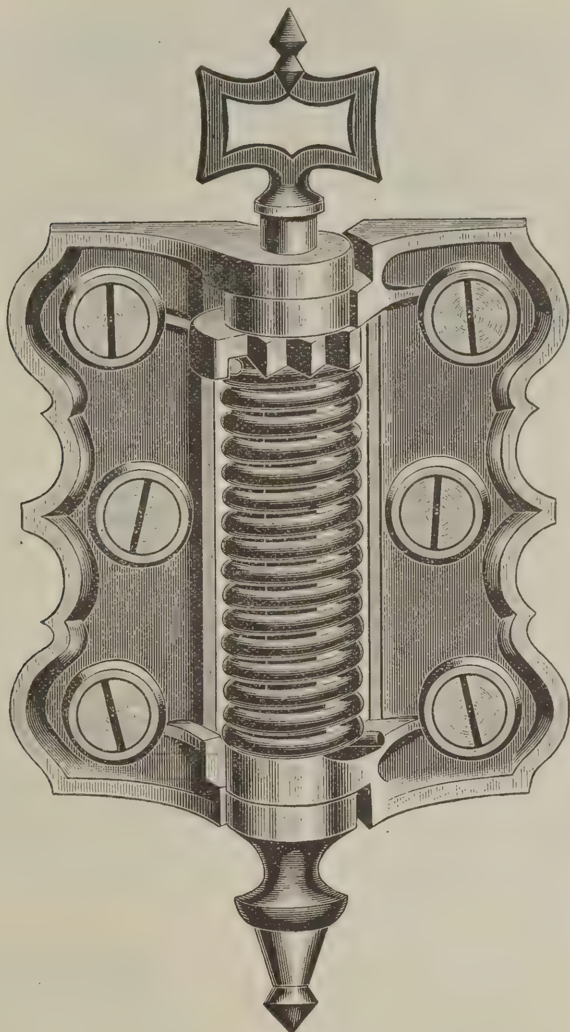


Fig. 4.—The Tangentograph as Applied for Marking Tangents for Face Molds, Also for Getting Bevels for the Joints.

This movement of the instrument obtains the angles of tangents. The third and last position of the instrument is shown in Fig. 6, and makes application of the angle found for the tangent of the face mold and at the same time obtains the bevels for the twists, also the position of



Novelties.—Fig. 7.—The Sure-Shut Spring Hinge.

major and minor axes, should this be desired, for drawing the curves of the face mold. In this last position of the instrument the bevels already referred to are opened out and stand at right angles to the blades. They are shown fixed thereto in the way in which they are used. Fig.

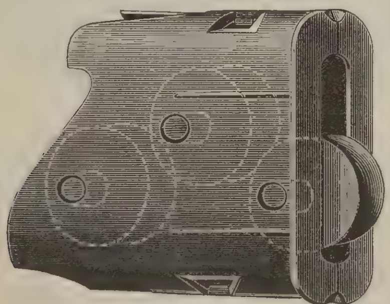


Fig. 8.—The Ideal Sash Pulley.

6 shows the application of the bevels when detached and applied to the wood. The experienced stairbuilder will readily see how, by the adjustments provided in this instrument, lines and bevels can be obtained almost instantly that ordinarily would require considerable drawing to produce. The usefulness of the tool, as shown in the applications illustrated above, will at once be perceived.

Sure-Shut Spring Hinge.

This is a new hinge presented to the trade this season for the first time by the Keokuk Novelty Company, of Keokuk, Iowa, who are the manufacturers. The claims made for it are three—simplicity, positive action and adjustability. The illustration, Fig. 7, shows the simplicity of its construction, it having but one more part, aside from the spring, than an ordinary loose pin butt. Its positive action causes it to close the door from every point. Its adjustability enables the ordinary wear of the spring to be taken up by simply pressing down on the pintle and turning to the right one notch, which will insure its shutting a door as effectively after months of wear as on the first day of use. Seven feet of wire are used to each pair, making an unusually large and long coil. Any two hinges make a pair, each being constructed to work equally well for right and left doors.

Ideal Sash Pulley.

The Stover Mfg. Company, Freeport, Ill., are putting on the market the sash pulley represented in Fig. 8, which they designate as the Ideal. The illustration represents its full size, and indicates clearly its construction. It will be seen that each pulley has three wheels on which the cord is carried. In inserting the pulley it is necessary simply to bore two $\frac{7}{8}$-inch holes and drive the pulley in place, the pulley being so made that it mortises its own hole, securing a perfect fit in every case and materially economizing labor. The points made in regard to it are, that no screws are required to hold it in place, no time lost in fitting a mortise, that there is no misfit, and that therefore the pulley can be applied with exceptional rapidity. The company also make for use in connection with this pulley the marking gauge represented in Fig. 9. As will readily be perceived, this gauge lays out the work accurately and makes prick-marks for starting the bit, so that with its use there is no liability of boring the holes wrong.

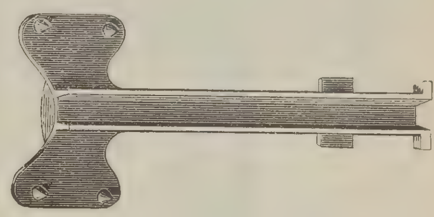


Fig. 9.—The Ideal Sash Pulley Marking Gauge.

In using this gauge, as will readily be understood, it is laid in the groove, when a blow of the hammer drives the points in the wood where the holes are to be bored. One of these gauges is furnished with every lot of pulleys, and if the order is for a large quantity a number are included.

New Mortise Door Bolt.

The illustration herewith, Fig. 10, represents the Ives Mortise Door Bolt, which is manufactured by Hobart B. Ives & Co., New Haven, Conn., for whom John H. Graham & Co. are agents, 113 Chambers street, New York. This new bolt, which is intended for use on outside and inside doors, is quite similar to the Ives patent bolt, with which the trade are familiar, but embodies some improvements. It locks each way, when thrown out or reverse, and has the appearance in operation of an expensive lock. The design of knob and escutcheon is new and attractive, and is manufactured in several styles of finish. The manufacturers especially refer to the size of this bolt, $\frac{3}{4}$ inch, as adapting it to a more common bit, while it is claimed that equally as good throw is secured as by other makes, which as a rule require a $1\frac{3}{16}$ inch bit for application.

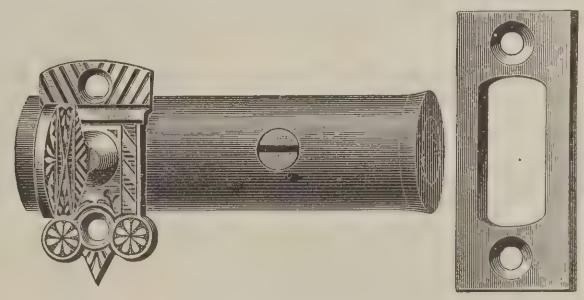
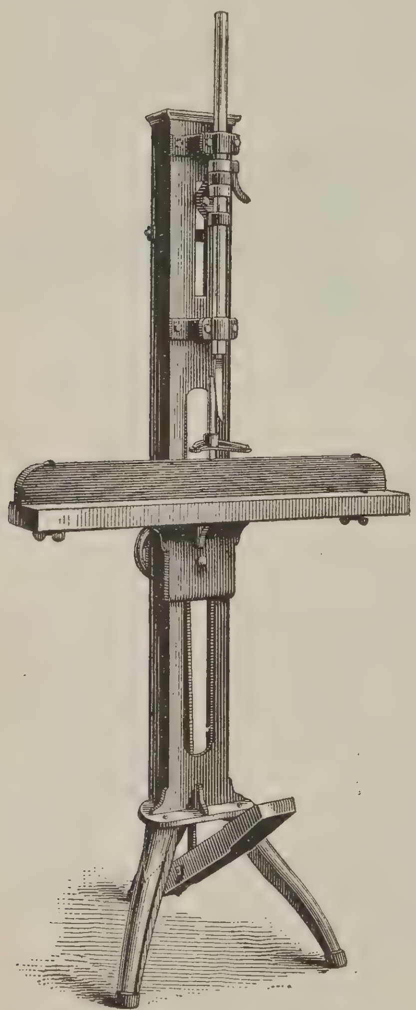


Fig. 10.—Ives' Improved Door Bolt.

Foot-Power Mortising Machine.

The device shown in Fig. 11 of the engravings, which is being put upon the market by Snedeker & Voorhees, of Jamesburg, N. J., is claimed to contain all the good features of the ordinary mortiser, besides having improvements not found in the ordinary styles of machines. The construction is similar to that of the combined machine which this company are manufacturing, and with which some of our readers are already familiar. The great length of the chisel-bar and the adjustable box with which it is provided insure steadiness of motion and also adjustment for wear. The reverse is simple and accurate, and, being arranged without springs, is of a character not liable to get out of order. The makers assert that the table is adjustable to any desired position on the column and is secured in place by a



Novelties.—Fig. 11.—Foot-Power Mortising Machine.

hand-wheel in the rear. The gauge is also adjustable on the table or from the chisel, and is held in position or secured to the table by two thumb-nuts. Another feature to which the makers direct attention is the work holder. It is secured to the sliding gauge so that when once set it need not be changed, even though the table should need readjusting. The machine occupies less space than the ordinary type, and, having no wood springs extending crosswise of the machine, is desirable where space is limited. A coiled-steel spring inside the column is depended upon for the required motion. The makers inform us that the machine is made of iron and steel, excepting the table and treadle, and is warranted in all particulars.

Universal Door Hanger.

This new door hanger, Fig. 12, which is manufactured by the Moore Mfg. Company, 51 and 53 Franklin street, Chicago, is designed to avoid as much friction as possible. Its construction is simple and requires no extended description. The straps

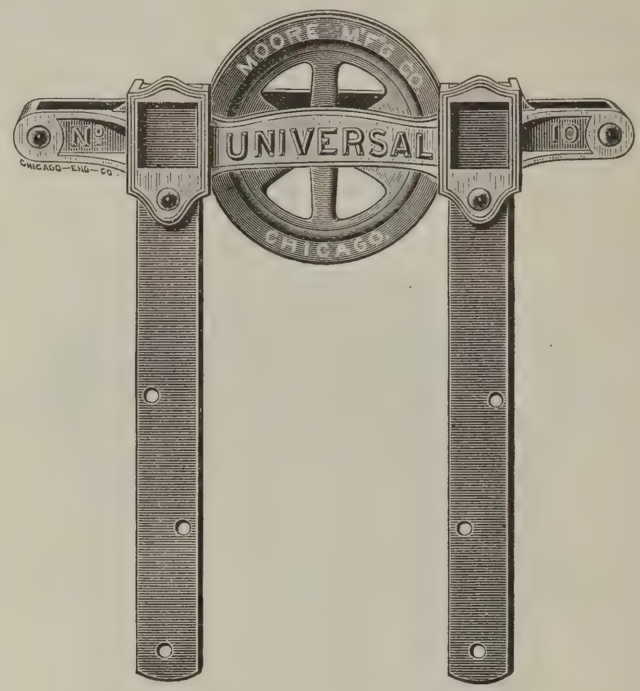


Fig. 12.—The Universal Door Hanger.

are of steel, $1\frac{1}{4}$ x $\frac{1}{4}$ inch, the slots are of malleable iron with $\frac{1}{2}$ inch bearings, and the axle is of steel with a 5-inch wheel.

Rose Ventilating Window-Sash Lock.

This article, which is manufactured by the Andrus Manufacturing Company, Rochester, N. Y., is represented in Fig. 13 of the illustrations. It is intended to fasten the sash at any desired point, thus doing away with the rattling of windows, affording a safe means of ventilation and also tightening the windows so as to keep out dust and cold air, thus serving as a weather strip. The sash locks are referred to as neat in appearance, easily put on, not liable to get out of order and not damaging the finish on the window. They are made of malleable

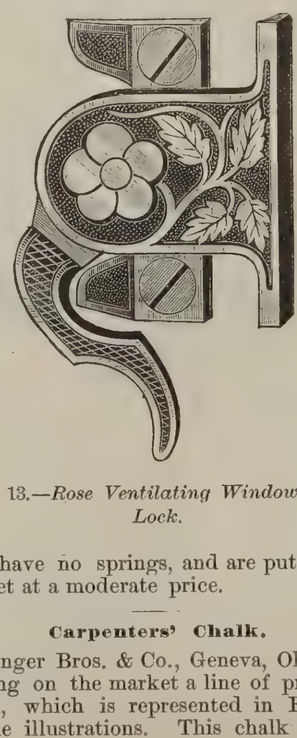


Fig. 13.—Rose Ventilating Window-Sash Lock.

iron, have no springs, and are put on the market at a moderate price.

Carpenters' Chalk.

Munger Bros. & Co., Geneva, Ohio, are putting on the market a line of prepared chalk, which is represented in Fig. 14 of the illustrations. This chalk is prepared for use in the shape of a cube instead of the old style shape of a half sphere, and the manner in which it is put up is shown in the cut, the chalk being packed in one-half gross boxes. The following advantages are claimed: That the shape permits the packing of the chalk in smaller boxes, taking less room on the dealers' shelves; that it is not as liable to roll on a roof or other inclined surface; that a cube of the standard contains a greater quantity than the usual shapes, and that the corners are not as liable to break off. The quality of

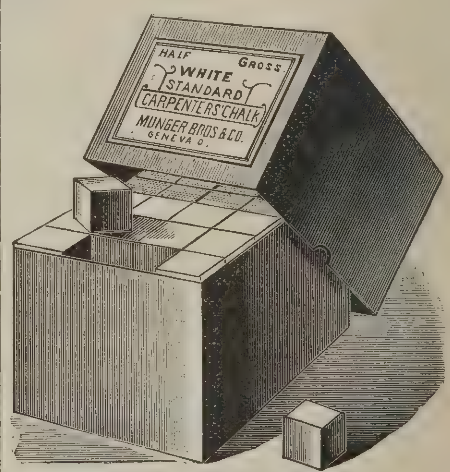


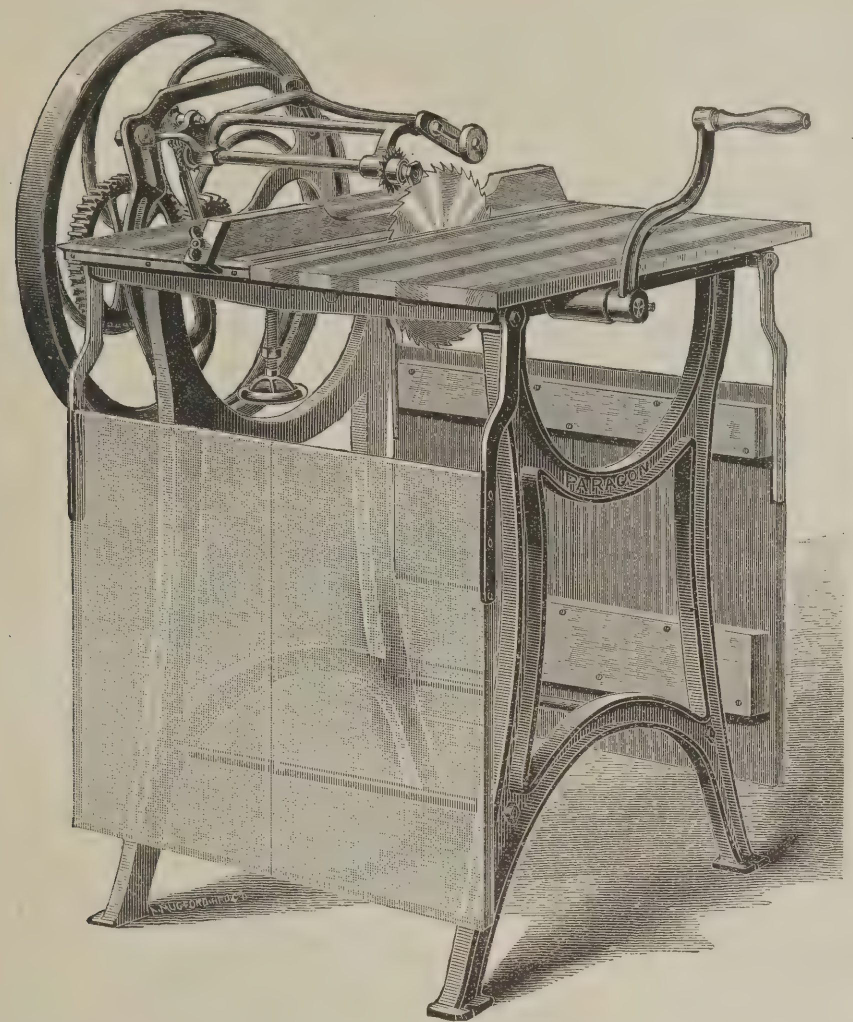
Fig. 14.—Carpenters' Chalk in Cubes.

the chalk is also alluded to, being described as free from grit and not liable to cut a line.

The Paragon Self-Feed Rip Saw.

The Seneca Falls Mfg. Company, Seneca Falls, N. Y., have just ready for the market a new self-feed rip saw, which they are introducing under the name of the Paragon. The accompanying engraving affords a general idea of the appearance of this device. It is designed for carpenters, builders and all wood-workers who have ripping and grooving to do. Two changes of speed are provided and the machine can be driven from either side as desired. The feed is adjustable and is self-adjusting for all ordinary work. It is positive in its

action, the power being transmitted from the driving shaft by gears. The feed has three changes of speed, adapting it to various kinds of work in ripping, groov-



Novelties.—Fig. 15.—Self-Feed Rip Saw, Built by the Seneca Falls Mfg. Company, Seneca Falls, N. Y.

ing, &c. The table is of hard wood and is provided with an adjustable gauge, being hinged at the back. This gauge can be raised or lowered by the hand screw for grooving, rabbeting, &c. For convenience in ripping long stuff the drop leaves shown in the cut are provided. When these are raised they make a long table. With reference to the capacity of the machine, the company state that with it one man can easily cut soft wood up to 3½ inches thick and hard wood up to 2 inches thick, doing the work of from four to six men with the common hand-saw. They assert that the machine works accurately, saves time, lumber and labor. Should occasion require, a pulley may be attached to the driving-shaft in place of the balance-wheel, thus adapting it to steam power. Any size of saw can be used on the machine from 6 to 10 inches in diameter.

The Peacock Combination Ladder.

The accompanying illustrations, Fig. 16, represent a ladder which is put on the market by the Peacock Ladder Works, Cleveland, Ohio, and show the different uses to which it may be put. It is shown, it will be observed, as a 10-foot straight ladder, a two-sided 5-foot step-ladder, a two-sided 3-foot step-ladder and as a wash bench capable of holding three tubs. An adjustable ironing-board is also shown attached, thus furnishing what is referred to as a convenient ironing-table. The hinge and fastening which is used in the ladder in accomplishing these transformations is also separately represented. The ladder is described as made of the best of wood, with malleable-iron castings, and is alluded to as strong and durable, while the different uses to which it can be put are also mentioned.

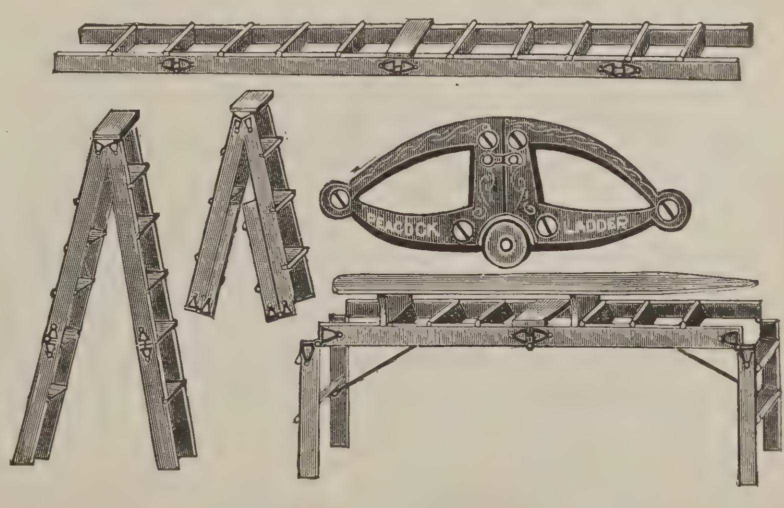


Fig. 16.—The Peacock Combination Ladder.

The Coburn Door Hanger.

This hanger, which is represented in Fig. 17 of the illustrations, is manufactured by the Coburn Trolley-Track Mfg. Company, Holyoke, Mass., for whom Page, Newell & Co. are general sales agents, 139 Milk street, Boston, and 16 Dey street, New York. The special features of this hanger are shown in the cut which represents it applied to a car door. The track A is especially referred to as possessing new and distinctive features, and is made in a drop press from a single piece of sheet steel, and when taken from the press is described as being absolutely true and straight, and from its peculiar form possessing great strength and stiffness. The wheels or rollers are made of cast iron in pairs, with an ordinary steel pin for a center. These wheels roll on their periphery in the grooves of the track, while the center pin rolls on the wrought-iron hanger which is attached to the door. The track is held in position by the brackets B, and the brackets are secured by lag

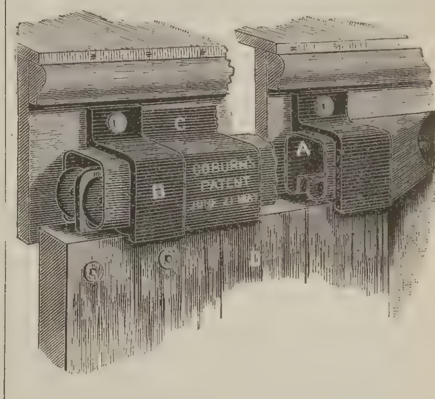


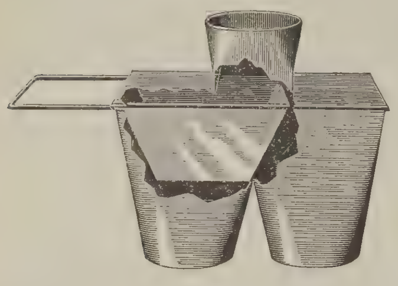
Fig. 17.—The Coburn Door Hanger.

screws or bolts. The steel shield held in position by these same lag screws or bolts covers the entire track and laps over the top of the door, thereby rendering it, it is claimed, storm and dirt proof. While the circular relating to this hanger represents it as applied to freight car doors, it is referred to as serviceable as well for all sliding doors.

Schultz's Rain-Water Cut-Off.

A rain-water cut-off having the merit of extreme simplicity and apparently of very durable construction is being put upon the market by W. W. Alexander, Richmond, Ind. The illustration presented, Fig. 18, shows the main features of the cut-off and its method of operation. It will be noticed that the slide is hopper-shaped, the ends being slanted considerably. By this construction the water is thrown into either pipe as may be desired, by simply pushing in or pulling out the handle attached to the slide. The deviceis not automatic in its operation, and must be moved whenever it is desired to

shut off the water from either the cistern or waste as the case may be. It will be noticed further that by moving the slide part of the distance, the water may be admitted partially into each of the lower pipes. The cut-off is substantially made and is self-sustaining in any position. Among the special advantages referred to by the



Novelties.—Fig. 18.—Schultz's Rain-Water Cut-Off.

manufacturer are that it requires no lever, spring or catch to hold it when set; that it will not burst in freezing, nor get out of order, and, furthermore, is simple, cheap and durable. The cut-off is made in regular sizes.

Metal Balustrade for Stairway.

The engraving below, Fig. 19, represents an appropriate design in metal work for a stair balustrade. A wooden hand rail is employed, and ironwork has been used to occupy the space usually filled by balusters. The design is of work recently executed by J. E. Bolles & Co., Detroit, Mich. The parts are clearly shown in the

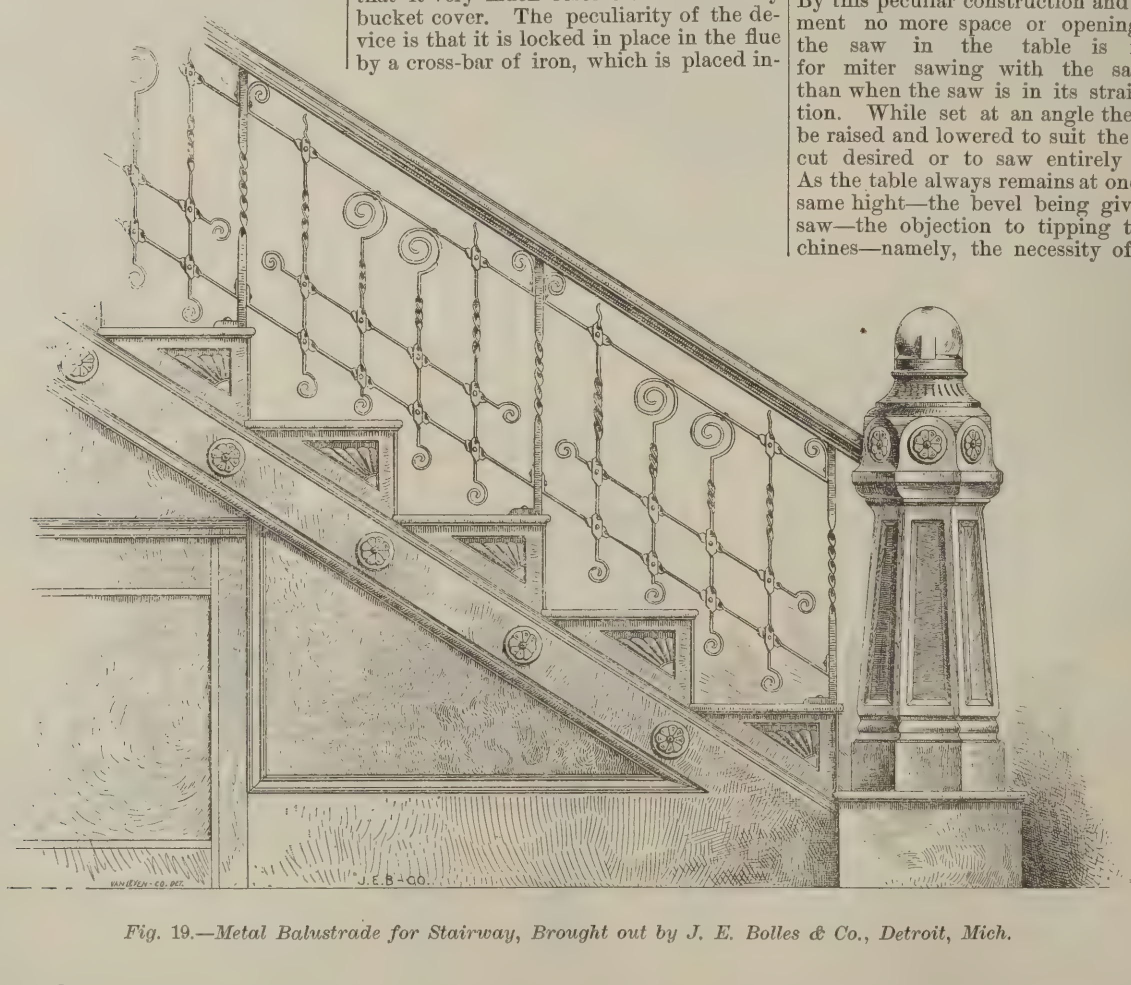


Fig. 19.—Metal Balustrade for Stairway, Brought out by J. E. Bolles & Co., Detroit, Mich.

engraving, and the reader will readily perceive by the way in which the elements have been combined that the characteristics of the material have been carefully observed. The various pieces have been flattened where they lap, and are properly united by a rivet. A twist in the principal straight portions adds to the ornamental appearance, while scrolls at intervals serve to fill up spaces which would otherwise be open and bare.

New Flue Stopper.

Thomas Lee, 46 and 48 Race street, Cincinnati, Ohio, is introducing a new flue stopper, the general features of which will be understood by Fig. 20 of the engravings. The part presented to the eye

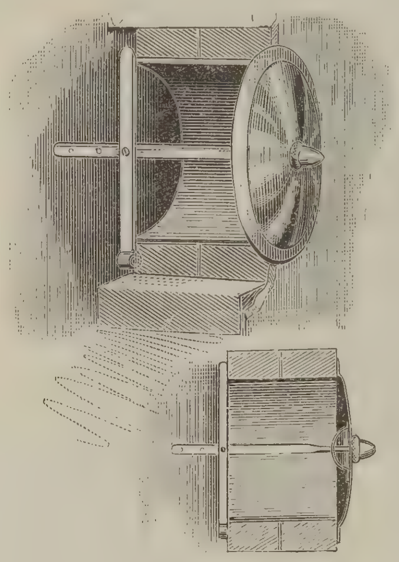


Fig. 20.—Lee's Flue Stopper.

when the stopper is in place is not unlike that which has been used in the past, in that it very much resembles an ordinary bucket cover. The peculiarity of the device is that it is locked in place in the flue by a cross-bar of iron, which is placed inside of the flue, and which is connected with the stopper by a rod with a threaded end, over which is screwed an ornamental nut, as shown. The rod is provided with different holes, so as to permit the cross bar to be set at different distances from the stopper, thus making it possible to fasten the stopper in place permanently with different thicknesses of wall. The simplicity of the device and its convenience will be readily understood by reference to the engraving. We understand that a patent on this article is now pending. Variations of construction are possible, as will be seen by comparing the two views in the cut presented herewith.

Miter and Bevel Saw Table.

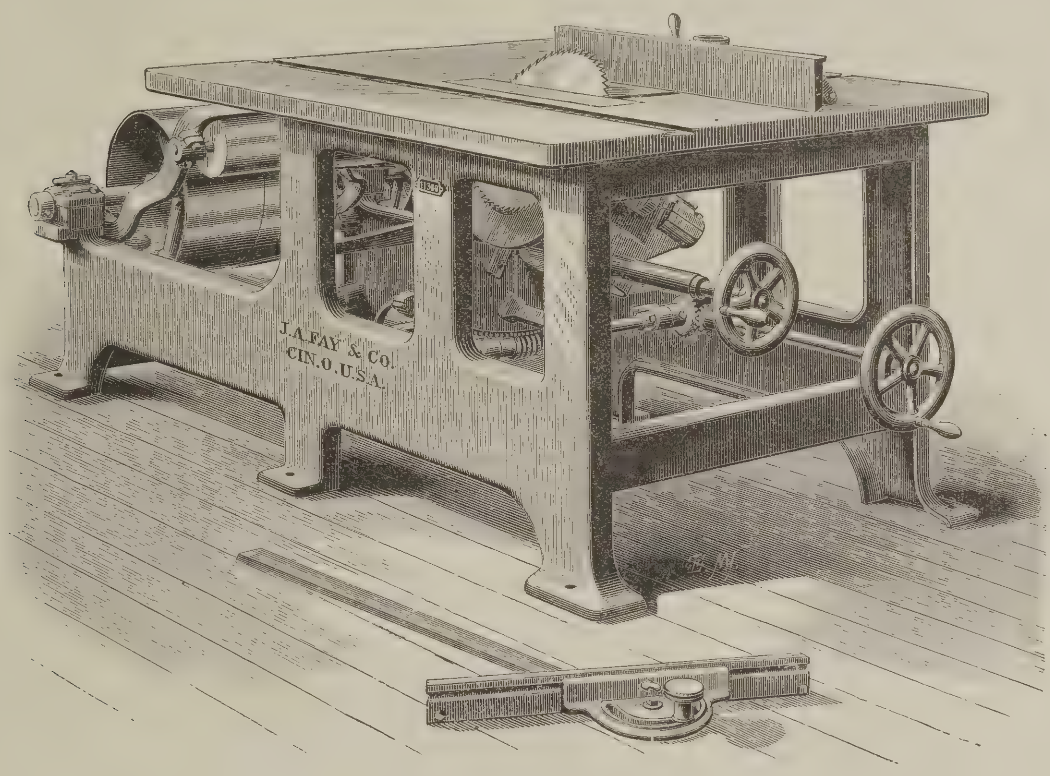
A machine recently brought out by J. A. Fay & Co., Cincinnati, Ohio, is shown in Fig. 21 of the engravings. It is described as an improved miter and bevel saw table with elevating and swinging arbor. In its construction and the work to which it is adapted it is of special advantage to manufacturers of woodwork in general, and particularly to cabinetmakers, pianomakers, carriage builders, &c. As will be seen by even a casual glance at the construction, the machine is strong and substantial, being entirely of iron. The arbor is described as being of large diameter with large journal boxes, and is raised and lowered in a heavy gib frame and at a proper angle so as to retain the same tension of belt at whatever hight the saw may be raised. This is accomplished by the central hand wheel in front, which is of convenient access to the operator. By this arrangement the table always remains at the same hight. The table is provided with an adjustable bevel fence which works in a planed way to and from the saw and which is adapted to be quickly set at different angles. The saw arbor and saw can be set at any angle from a vertical line up to 45°, by simply turning the lower handwheel at the left, either while the machine is still or while it is running. By this peculiar construction and arrangement no more space or opening around the saw in the table is necessary for miter sawing with the saw tilted than when the saw is in its straight position. While set at an angle the saw can be raised and lowered to suit the depth of cut desired or to saw entirely through. As the table always remains at one and the same hight—the bevel being given to the saw—the objection to tipping table machines—namely, the necessity of holding the material to the table while being sawed, is entirely overcome. The top of the table being the center upon which the arbor frame swings, the work is always upon a level plane and any miter, plain or double, that may be desired can be quickly made, cutting two at one operation, the saw

making one and the gauge the other, with perfect exactness, so that the edge pieces will fit exactly in place. The counter-shaft, the makers add, is attached to the machine and carries a guide pulley, by which the belt to the arbor is always retained upon the center of the arbor pulley, no matter at what angle it may be set.

A Woman's House.

BY SHIRLEY DARE.

If the men who build dwellings had the housekeeping to do in them afterward, a speedy change of plan would result. I should like to see the man who designed the room where this is written condemned to dust and keep its treble ogee moldings board or paneled to a distress; even the kitchen shelves and towel roller have worked brackets for the flies to sit on, and worst of all every door handle is embossed. When tired with a forenoon's effort at making this incorrigible house neat, I sit down and rest myself with planning how some spare season, when everybody is away from home, I will take chisel, wedges and hatchet and rip off every foot of that wretched molding, every board of that tongued and grooved casing and have them replaced by the plainest flat casing, with nothing more than a rosette in the upper corners by way of relief. Being of a thrifty turn, I shall sell that ogee molding for a church or work it up into picture frames and gild it, or else——. Will some person with a clever head please tell me of any earthly use for that molding, besides selling it to torment the soul of some other street and when it is moved it had better have some alterations made. Best of all will be to pull it all down and build it over. I've been planning that little new house for ten years, studying one detail after another—hall, staircase, closets and fire-place—always with one idea of plain, attractive, homely comfort and use. There shall not be a line about it for ornament; every feature shall be studied for pure use and convenience, yet the whole expression be such homelike grace and content that passers will turn to look as far as they can see it. I know a few such houses—mostly dating back of the century—sunny, sheltering places, only to be fully described by the epithet "homely," in its ancient, lovely sense, "homelike." In this country, where the newest fads in building are tried to excess, where the sky-scraping roofs of parrot-colored houses offer the



Novelties.—Fig. 21.—Miter and Bevel Saw Table, Built by J. A. Fay & Co., Cincinnati, Ohio.

nice, around double doors, three single ones and five large windows, to say nothing of the double molding which finishes the baseboard on 30-foot sides. The builder must have been fond of ogees, for a neat little one runs under each window sill, for no earthly purpose I can devine but to furnish a surface for dust. From kitchen and pantry to attic every foot of casing in this 10-room house is finished with that tiresome molding which offends every artistic sense in one, by being altogether too pretentious for a house where the amount of labor to care for it is any factor of account, as it must be in nearly all American homes. Not one servant in a hundred can be trusted to dust or clean such woodwork properly, and the time I have wasted in merely keeping those ledges free from offensive dust and fly specks in the last four years would have written a book, and the strength and nerve wasted on it in effort and vexation would have made that story a successful one. It is so with detail after detail in this average suburban house. The window sashes, instead of strength and plainness, are fretted with a silly beading that takes double time to clean; the stair railing is turned and sawed into ornamental intention, which makes the correctly trained eye ache with its poverty of design; every upright casing of dresser or washstand is beaded on each woman in a cheap dwelling house? That I never will do. It goes against my conscience.

Next the stair-railing will disappear for plain, solid, round turnings and the showy newel-post of semi-Egyptian character will be sawed up for the lathe, a plain, round post taking its place. The baseboard will be finished by the simplest bevel. The door-handles will not leave the print of their beading and Greek fret on the palm of the hand that turns them. They shall be neither metal nor china—both are too cold—but of plain, turned wood or compressed paper, pleasant to touch, unobtrusive to sight and easy to keep clean. The price saved on these fittings will be spent on window sashes, plain, stout and polished—not these machine-sawed things, so rough that the varnish does not fill the saw marks. Then I propose to have some painting done that will last to posterity, like that which Mrs. Carlyle found in her father's house, as good as when it was put on in her little girlhood—work done to last, seeing there were eight coats of it! Then I will have time enough from housekeeping to learn Greek and embroider the set of chair-covers I desire to leave my heirs. There will be comfort living in such a house.

While I am about it, I think it well to have the house moved back from the least comfort with the greatest expense, in summer drives one comes upon weather-beaten, hip-roofed cottages fronting south on some gentle slope, that are very dove-cotes in aspect, and, seeing, one sighs, "Oh, for the homely houses!"

GRANITE has become the favorite building material the past few years, and is largely employed upon Government buildings, as well as prominent office buildings, residences, &c. Accordingly there is interest in the simple question of what it comes from. A letter from Bangor, Me., which is located near one of the largest granite producing quarries says that between the erection of big Government buildings and the pavement of the streets of big cities, Maine's quarries will be pretty busy this year. The State of Maine is full of granite, especially along the Penobscot Bay and River, and quarrying has become one of the leading industries. The letter continues: "The walls of many a noble public building have been dug and blasted from Vinalhaven and Hurricane Isle and miles of metropolitan pavement have been quarried from Frankfort. When business is good at Vinalhaven 500 men are employed. Deer Isle is a great place for granite, and close on to 1000 men will be employed in the quarries there during the present season."

TRADE NOTES.

A FORM of wood shingle is the subject of a patent granted to H. C. Henderson, of San Francisco, Cal. The invention, as described in the patent specification, relates to improvements in shingles for covering houses and the apparatus for preparing the same. The shingles instead of being square at the end are shaved on the edges in such a way as to present an angular opening between abutting shingles. The device for trimming the shingles is a revolving disk in which knives are placed, and a table with gauges against which the shingles are laid and fastened while being shaved or trimmed.

A FORM of lime kiln was patented a short time since by John H. Wallstrom, of Rockford, Ill. The invention relates to the class of lime kilns known as "perpetual kilns." It is of the variety in which the fuel combustion-chamber is separated from the chamber containing the limestone to be burned, and in which the gases produced in the fuel combustion-chamber pass through flues into the chamber containing the limestone, and in connection therewith is ignited to burn the stone to lime. The object of the present invention is to improve this class of kilns and to render them more efficient. To this end a central core is introduced in the base of the chamber, an annular gas flue is employed, and flues connecting the combustion-chambers and annular gas flue are employed.

THE MATTHEWS DECORATIVE GLASS COMPANY, No. 328 East Twenty-sixth street, New York, have recently introduced some very handsome designs of glass in stock sheets. This enables dealers to carry ornamental glass in stock ready to cut to required size. Another specialty is the Matthews silver embossed plate of sheet glass, which is being largely used in office buildings where obstructed glass is wanted. This product is said to be very much superior to ground glass in appearance and possesses the special advantage that it does not show finger marks or pencil writing. The company are also large manufacturers of chipped glass in white and color. The line of glass material which this company are manufacturing is very large, as is attested by their circulars and catalogues.

WE HAVE RECEIVED from Peel & Metz, 104 West Forty-second street, New York, a copy of their circular illustrating their wood carpets, parquetry and inlaid floors, wainscoting and ceilings. Some 25 designs are shown complete, with numerous variations in borders, trimmings, &c. Accompanying the catalogue is a circular giving directions how to measure for work of this kind. There is also presented price lists relating to the goods described. These circulars are of interest to many in the trade and are in shape to be useful to all applicants.

EDWIN A. JACKSON & BROTHER, manufacturers of the well known Jackson heat-saving and ventilating grates, with office at No. 50 Beekman street, New York, inform us that their grates have been adopted by the Court House Commissioners, St. Paul, Minn., and that accordingly they will be used in the new court house in that city. A recent issue of the St. Paul *Daily Globe* contains the following: "After a full and deliberate consideration of the merits of the various grates it was moved by Mr. Dawson that the bid of G. F. Tostevin for ventilating grates be accepted. The motion was unanimously carried. Mr. Tostevin is agent for the Edwin A. Jackson & Bro., grate. His bid was the highest, but the commission were of the opinion that the Jackson grate was the cheapest for the money." The firm, writing us concerning the above, state that the contract was for over 100 grates, constituting a very large order, and add: "In the contest there were the exhibits of Edwin A. Jackson & Bro., of New York, manufacturers of the Jackson ventilating grate; of Wm. H. Jackson & Co., who represented the Jackson Sanitary grate; of the Omega Grate Company, who showed the Omega fireplace furnace, also of the Hess Grate Company, of Chicago, and the Miller Grate Company, of one of the Northwestern cities."

THE CINCINNATI CORRUGATING COMPANY, who always aim to be up with the times and generally a little ahead, call attention, in another column of this issue, to the subject of steel arches, to which they have been giving considerable attention. With their most excellent facilities the company have introduced the manufacture of steel arches, with the greatest success.

THE NEW YORK office of Bakewell & Mullins, of Salem, Ohio, which has heretofore been on Broadway, near the corner of Murray street, has recently been moved to 108 Chambers street. It is in charge of Julius T. Wagner, who has represented the establishment for a year past, a gentleman well known to the architectural fraternity and the sheet-metal trades in New York. The firm propose to maintain a stock of ornamental architectural ironwork at this depot, so as to be able to fill orders from it. The rapidly increasing trade of this concern in the East necessitates the change above referred to, and in the new location excellent facilities are provided for conducting the business.

A MACHINE for embossing wood or other material is the subject of a United States patent, recently issued to Bernhard Ludwig, of Austro-Hungary. According to the patent specifications ornamental patterns in relief are produced upon plane or curved surfaces of wood or similar material by pressing specially constructed, highly heated, rollers against the surface of the wood. The construction of the rollers is such that while the parts which are in intaglio on the wood or other material are more or less charred, those parts which are in relief do not come in contact with the heated mold or roller and remain uncharred, preserving their natural color without alteration.

AMONG THE RECENT shipments of wood-working machinery made by Messrs. Cordesman, Meyer & Co., of Cincinnati, was a large outfit consisting of two carloads for a planing mill at Oceanside, Cal. The firm represent that numerous other smaller orders are on their books for future shipments, and that trade has been exceptionally brisk with them this year to date.

L. R. ENOS, of Andover, N. Y., a short time since took out a patent on improvements in doors. The features of the patent relates to the construction of doors, the frames of which are of wood and the panels of which are of corrugated metal. The gist of the invention is a brace, flanged and corrugated in a way to fit over the panel and support it in the center.

WE ARE INDEBTED to the Board of Directors of the Ohio Mechanics' Institute, Cincinnati, Ohio, for a copy of the sixtieth annual report of that organization. The course of study is described, and there is also given a list of awards of the thirty-second session of the industrial and art school.

THE COMPOSITE IRON WORKS COMPANY, 83 Beade street New York, send us a circular descriptive of the Bostwick patent folding gate, of which they make a specialty. The gate is shown applied to windows, doors, vestibules, elevator entrances, driveways and in other places. The fact that this form of guard is coming into extensive use indicates the general satisfaction of the public with it.

WE ARE INFORMED that the Egan Company, of Cincinnati, Ohio, have commenced a suit in the United States Court against J. W. Fay & Co., of that city, for damages for an infringement of a patent friezing or shaping machine, with friction reverse. Plaintiffs also ask for an injunction. The suit, we learn by local papers, is attracting much attention among users of wood-working machinery.

IN ANOTHER PART of this issue J. Bardsley, 59 Elm street, New York, presents an illustration of his checking spring hinges for double-acting doors. These hinges are said to be silent, gentle, effective and durable. The illustration is a very excellent presentation of the device.

THE HARTMAN inside sliding window blind, manufactured for the United States by Hartman & Durstine, of Wooster, Ohio, is a device that is likely to prove of interest to a large class among our readers. In their card, which appears in another part of this issue, they offer their illustrated catalogue to all applicants, and state that agents are wanted in every part of the country. Witheroe & Hillock, Toronto Canada, manufacture the same device for the Dominion.

THE THOMPSON MFG. CO., Cleveland, Ohio inform us that the demand for their iron roofing is extending all over the United States, and mention a number of very large orders which have recently been received from distant points. They state in their card, which appears in another part of this issue, that they want to mail their new illustrated catalogue, a book of 84 pages, and which they claim to be the finest ever issued by any roofing company, to each reader of this paper. We have examined the book and know that it is well worthy of perusal.

THE REPUTATION of the Peerless Brick Company, Philadelphia, is almost world-wide. With a production of 16,000,000 brick annually, including 5,000,000 pressed brick, and with no less than 600 different designs and shapes of ornamental brick, they seem to be in position to meet any demand that may be made upon them. Their works occupy some 70 acres of ground. The card of the company appears in another part of this issue, and one item mentioned therein will be found of special interest to our readers—namely, that their illustrated catalogue and price list is sent upon application. We have seen the trade publications of this company, and know that they are of more than passing interest to architects and builders in general.

EVERY MECHANIC should mark his tools in order to identify them in case of dispute. J. M. Stutzman, 181 William street, New York, directs attention in another part of this issue to steel alphabets and tool stamps adapted for this purpose. What will be interesting to shop men is the reduction which he offers to clubs of 12 names and over.

AS THE RESULT of considerable correspondence growing, out of the article which appeared in a recent issue of *Carpentry and Building*, C. Powell-Karr, Room 217 Stewart Building, New York City, proposes to furnish estimates from building plans and specifications for work to be done and material supplied in the Eastern and Middle States. Mr. Karr has had long and special training in the direction named, and no doubt his ability will be found particularly serviceable to a large class among our readers. His card appears in another part of this issue.

WE HAVE RECEIVED from F. A. Requarth & Co., 34 South St. Clair street, Dayton, Ohio, a sample of their prismatic stair work, being a baluster with square base and cap, with molded sections contiguous to these and a square tapering center-piece with chamfered corners, forming, in effect, an octagonal shape. The sample is conspicuous for its correct lines, perfect forms and clean cutting throughout. This firm are well known for their polygonal and prismatic work, all of which has high architectural merit. They offer a catalogue and price list to all applicants.

J. P. CONROY, Sixteenth and Catherine streets, Philadelphia, directs attention in his card in this issue to the Conroy Refrigerator Door Fastener, a device which has the advantages of simplicity and effectiveness. It is composed of few parts, has the effect of locking the refrigerator door tightly in place and yet in a way to be instantly released.

IN ANOTHER PART of this issue the Stanley Rule & Level Company, of New Britain, Conn., and Chambers street, New York, direct attention to the Stanley adjustable chisel gauge, a device useful in finishing work where blind nailing is required. By attaching the gauge to a ¼-inch chisel a shaving of any thickness can be raised with precision, which, when glued down again, fits the recess perfectly.

THE J. F. PEASE FURNACE COMPANY, Syracuse, N. Y., and Toronto, Ont., with offices in New York, Boston and Chicago, direct attention in their card in this issue to their improved Economy warm-air furnaces, a catalogue of which they offer free to all applicants.

A SAW FILLER recently patented, and which, it is claimed, saves time and labor is presented in another part of this issue by William Moore, of Mooney, Ind. The device appears to be simple, and is of a shape to be sent by mail.

HOW A HOUSE would be lined with mineral wool is illustrated in the card of the United States Mineral Wool Company, No. 2 Cortlandt street, New York, which appears in another part of this issue. Sections illustrating roof construction, wall construction and spaces between floor beams are presented.

THE DETROIT METALLIC SHINGLE COMPANY, corner State street and Park place, Detroit, Mich., are directing attention to the Eastlake metallic shingle which they are manufacturing. They claim for this article that it is the lightest and most durable roofing in the market.

CHARLES E. LITTLE, No. 59 Fulton street, New York, agent for Barnes' patent foot, hand and steam power machinery, sends us a copy of a new catalogue and price list which he has just issued. The various specialties made by the manufacturing concern above mentioned are shown in careful detail and many particulars are presented which are of general interest to buyers and users of machinery of this class.

CORDESMAN, MEYER & CO., 170 West Second street, Cincinnati, Ohio, send us a copy of their poster of wood-working machinery. It is illustrated by engravings of some 12 or more leading machines, which have the advantage of being sufficiently large to be readily inspected, and which show the features of construction and design peculiar to this company.

THE ILLUSTRATED CATALOGUE of new designs of stairbuilders' goods issued by S. E. Smith & Brother, 199 West Seventh street, St. Paul, Minn., is a pamphlet of upward of 60 pages and is illustrated by cuts that are of more than passing interest to the trade. A very considerable variety of newel posts are presented, following which are illustrations of hand rails, varying from the conventional balustrade to the latest ideas in work of this kind. A number of spindle-top balusters are shown, following which are fancy balusters, square balusters, carved balusters, &c. A number of designs for hand rails are also contained.

GOODELL & WATERS, the well-known wood-working machinery makers, of Philadelphia, write us: "We desire to call attention to our removal to larger and better quarters in Chicago. Since the opening of our Chicago branch our business has increased very rapidly. The sales at that point have been very large, and we soon found our facilities totally inadequate to meet the demands of the rapidly increasing trade. We have now secured the very desirable store, Nos. 63 and 65 South Canal street, where we shall carry a full and complete line of wood-working machinery and Dodge wood pulleys."

SAN FRANCISCO is to have a high tower to its city hall as well as Philadelphia. For the new city building, plans have been adopted for building a tower to be 420 feet high. Augustus Laver, the architect of the building, declares that this structure will greatly improve the general effect of the building. Speaking of the condition of the city hall building at the present time, a local paper says that much is at present being done on the building, and that it will soon lose the appearance of a mediæval ruin which it has borne for some ten years past.

A CONTEMPORARY says the blacksmith is always blowing about his work, to which the reply is made—Yes, and you can always know that he is going to strike when he goes to work with his hammer and bellows.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE article on Estimating, by Mr. C. Powell Karr, published in our columns a short time since, has attracted marked attention in different directions. Certain members of the architectural profession seem to be greatly exercised at Mr. Karr's strictures, and the broad insinuation that an architect's knowledge is very generally limited by his environment is haply repudiated. We think ourselves that Mr. Karr came very near telling the truth in this regard, unpleasant though it is, and accordingly we are not at all surprised that what he wrote should call forth criticism.

IT may interest some of our readers to know that the controversy with reference to the ceiling in the Assembly Chamber, at Albany, has finally been settled. After discussing the matter for some months, the Legislature which adjourned a short time since appropriated $350,000 to repair the ceiling, and this bill was signed by the Governor. Recent developments have shown that the temporary scaffold, mention of which was made in these columns some time since, was erected none too soon, for the cracking still continues, and a number of pieces have fallen. This has resulted in the decision to take the vaulted dome of terror and extravagance down and put in its place a new ceiling, not so high, not so costly and not quite so magnificent, but under which there will be greater safety.

HOW to work without interfering with traffic when a building is in progress —either in a new building being erected or in an old building being demolished—is a problem that is of importance to many builders, and not a few of them have been very ingenious in their methods devised to solve the problem. At present, with the largest constructions in New York, all *débris* is carted away each night, the sidewalks and streets being used in the meantime. With the *Times* Building, which is in progress of tearing down preparatory to the erection of a new building on the spot, a false sidewalk has been set up over the flagging for the reception of whatever is superfluous. In another building, further down town, a false sidewalk of wood where the flagging used to be has been put in place and is so arranged that all refuse can be carted away from beneath it.

THAT our styles of architecture are determined not by mere fancy, but, in some measure, by the religious belief of the nations and the habits of mind of the people, is very generally known. Writing on the past and future in architecture, and with this thought in mind, E. S. Dallas says: "That the Hebrew, the highest type of the lyrical mind, fed upon futurity; that the Greek, the highest type of the epic mind, fed upon the olden time; and that each reveled in its own department of thought with a zeal and a zest otherwhere unequaled, can hardly be doubted. The Hebrew lived upon prophecy, and in everything, even in their buildings, it may be seen how the Orientals looked forward to after ages. The prevailing feature of their architecture is its massive grandeur, its stability; they built for posterity. Said Solomon at the dedication of the temple, 'I have built an house of habitation for Thee, and a place for Thy dwelling for ever.' The only exception to this rule is the Saracenic architecture, and it is an exception that strengthens the rule, since, if need were, it could easily be shown that the slenderness for which it is noted was a true offspring of that Moslem faith which, disregarding a future upon earth, courted such a death as might insure a future in the paradise above, amid the bowers of the Houris. Greek architecture, on the other hand, neither mocked the eye, as did the Moorish palaces, by a seeming frailty and contempt of permanence, nor, like the piles of Egypt and the East, forced the idea of strength and of futurity upon the beholder. It sought, rather, by marble friezes and other sculptures embodying legends of the past, to set the hoary crown of eld upon the brow of their temples."

THE foreign demand for the products of American planing mills is something which has not so far attracted very much attention. The *Export Journal* says: "There is one growing branch of the American export trade which is noteworthy. We refer to the shipments of doors, sash, blinds and other house finishings. Although this trade has been going on for years it does not seem to have attracted particular attention, and those engaged in it have not probably been anxious to have it understood that there is a profitable foreign demand for such manufactures. In looking over the comparative statements of exports furnished by the Treasury Department we find that this trade increased nearly 30 per cent. during the nine months ended with March of this year. This is certainly a very considerable growth, and it gives assurance that products of this character have been found to be cheap, serviceable and economical. Indeed, there is no reason why this trade should not grow, for, with the vast supplies of material, the labor-saving machinery applied to its conversion, and the facility with which the manufactured goods can be shipped and transported, and the low prices at which they are sold, it is very much to the advantage of house builders to supply their needs direct from American factories."

SOME time since some of our correspondents raised the question of the successful laying of brickwork in freezing weather. About the same time the subject was taken up by some of the foreign architectural and mechanical papers, and since that date the journals referred to have been filled with discussions of the subject. Quite recently the *American Architect and Building News* has presented a *résumé* of some of the more important features developed in the discussion referred to, and as being likely to interest our readers, we present a part of what our contemporary contained on the subject: "The stories of the excellence of stonework laid with hot mortar in Stockholm and other Northern cities in winter, and then allowed to freeze, have multiplied, while, on the other hand, a recent report by an American engineer, Mr. Emil Kuichling, appears to show conclusively that mortar, particularly if made with cement, and used hot, lost a large part of its strength; the resistance, as determined by actual experiment, of briquettes of neat cement, mixed hot, and then exposed for seven days to the air, being, on an average, only one-eighth that of briquettes of the same cement, mixed at the same time, with water having the temperature of the air, and then exposed in the same way. Curiously enough, briquettes made with Portland cement and cold water would not freeze, even at a temperature of 13° F., unless exposed to the wind, and the setting process appeared to go on undisturbed even at this temperature; while briquettes made of the same cement, mixed with hot water, invariably froze. With natural cements the resistance to freezing was much less than with the Portland, but no details are mentioned on the subject. The addition of salt to water, sometimes made to prevent freezing, is found to injure native cements, while Portland is not affected."

IN the endeavor to dispose of the surplus in the National Treasury, various schemes have been suggested, and among those which have recently been considered is that of erecting Government buildings in all the towns of the United States in which the postal receipts of the past three years have exceeded $3000 annually. The far-reaching effect of this bill, in case it should become a law, will be perceived by the statement that there are upward of 100 towns in the State of New York alone which would be entitled to a building at Government expense. This does not include those in which Government buildings have already been erected. Inasmuch as provision is made that the buildings are not to cost less than $25,000 each, it is easy

to be seen that the outlay in New York State would be in the neighborhood of $2,500,000. For the entire country the expenditure would be something like $50,000,000.

THE interior of the new Consolidated Exchange, recently opened in this city, presents a fair example of sheet-metal ornamentation. We say a fair example because the work in question is neither the best nor the poorest that we have seen. Like many other jobs, it is open to criticism on account of imperfection in details of construction. The ceiling springs from the arches of the mezzanine story and is laid off in panels, divided by bold ribs, the intersections of which are concealed by rosettes. The ceilings, side walls, arches and capitals are of galvanized iron. The general impression is good, but, as already intimated, close inspection reveals numerous defects in some of the arches and ribs, and in the panels a want of continuity in lines is manifest. The ornaments forming the caps are not as bold as their position demands; they are not sufficiently sharp to bring out the design clearly; they are, in fact, flat and faulty, giving indistinctness to the design. It is to be regretted that sheet metal, forming such an important part in building construction as it does, should be so carelessly and inadequately constructed. Sheet metal, we believe, is destined to a higher rank than it has heretofore attained. It is beginning to be appreciated by architects and builders for its real worth; but it is very essential to its general adoption that the best skill and artistic talent be employed by manufacturers, to the end that it may be perfect in details wherever used. We hope to see much more interior work done in New York in the future than in the past, and if cornice workers in general will give to it their best skill—in other words, make it rank in quality and finish as high, relatively, as other materials—we know there will be a great increase in the trade. Without this effort, however, architects are likely to become discouraged if not disgusted and to hold themselves to the use of other materials.

THE coating of brick and wooden structures with coal tar, says a recent writer, as a rough-and-ready means of preserving them from the action of damp, has been common from the earliest days of the gas industry. It has also been usual in chemical works to protect the stones used in the construction of acid tanks, &c., by a preliminary soaking in heated tar. But the great improvement in strength and impermeability to moisture which results from the simple operation of boiling bricks and stones in gas tar is certainly not so generally known as it should be. Professor Lunge, in the new edition of his work, "Coal Tar and Ammonia," draws attention to the subject and indicates several useful applications. He points out that drain and roofing tiles, which are quite porous and brittle as they leave the kiln, may be rendered absolutely watertight and much stronger by immersion in a bath of hot tar. Building stones are also greatly improved by similar treatment; and for many purposes the dead black color which results is an advantage rather than an objection. The tar should be deprived of water and its most volatile oils; and to produce good results, the bath must be maintained at a temperature of at least 100° C. The articles to be treated should be thoroughly dried and allowed to remain in the tar for some time.

MANY of our readers will recall the fact that an immense raft of logs was built in Nova Scotia and the attempt made to tow it to New York. The idea in view was to get the timber into New York in a very cheap way. Fortune failed to smile upon the endeavor, however, and the raft was lost in a severe storm, and various reports since have occurred showing the direction of the logs as they have drifted with the currents in the ocean. From recent reports issued by the United States Hydrographic Office, it would seem that the logs have drifted in a direction about East by South, and that most of them are now Southwest from the Azores. Many lessons are to be derived from this incident, not only with respect to the importation of lumber, but also with respect to currents in the ocean, prevailing winds, &c. We understand that another attempt is to be made in the same direction, this time, however, instead of being towed, it is to be in a form to admit of management, the same as though it were a ship. In short, it is to be rigged with masts and sails.

HOW to season timber so as to prevent the ravages of dry rot is something in which builders generally are interested. According to R. F. Francius, to preserve oak timber from dry rot it should be laid in large piles in salt water for a whole year, and so as to be completely covered with the water. By this means the salt penetrates the wood and the consequence is that it remains always free from dry rot and lasts twice as long as it would do without this preparation. If the wood can be put into sea water perfectly pure and free from all earthy deposit it is so much the better, and on the coasts it may be best kept and prepared in basins dug for the purpose. Care must of course be taken to lay it so that it cannot drift away. Where salt is very abundant, wood may be seasoned by covering it with a thick layer of that material, when the air is damp and foggy, without heavy rain. The salt also destroys dry rot in building, as may be proved by washing the wood infected repeatedly with strong brine made hot. New wood may be prepared for use in the same manner.

AMONG the most lofty structures extant the Washington monument ranks first, its hight being 555 feet and the tower of the Philadelphia City Hall is 535 feet high or 15 feet higher than the Egyptian pyramids. Church spires in this country are not remarkable for their hight, but the twin spires of St. Patrick's Cathedral when completed will have an altitude of 330 feet, overtopping Trinity 44 feet and the Statue of Liberty exactly 1 foot. The highest office building in New York is the Washington, 1 Broadway, the apex of whose iron tower is 235 feet, while the flag floats at an elevation of 315 feet above the pavement. The Equitable was the first high building designed for office purposes, and the first of the kind in which elevators were introduced, but so successful was the experiment, and so manifest the value of the elevation in utilizing the spaces of the upper air for business purposes, that high buildings have sprung up like mushrooms since.

NEW PUBLICATIONS.

MANUAL OF THE BOUTON FOUNDRY COMPANY. Containing useful information for architects, engineers, builders and others; also cuts of patterns of columns, &c. Published by the Bouton Foundry Company (successors to Union Foundry Works), Chicago. 192 pages, flexible leather cover, pocket size. Price, $1.

This is a new and revised edition of a work which has attained great popularity among those interested in architectural work. It contains a great variety of very useful information, embracing tables showing the weight of cast iron per lineal foot, weight of cast-iron columns, weight of cast-iron pipes, strength of cast-iron columns per square inch, safe load of cast-iron columns, safe load of cast lintels, safe load of steel beams, spacing for equally distributed load of 100 to 175 pounds per square foot of iron and steel beams, properties of channel bars and bugle irons, weights of flat, square and round rolled iron per lineal foot; weight of iron, steel, copper and brass sheets per square foot; safe load of wooden beams; weight of substances; strength of miscellaneous materials, &c.; cuts of columns of a great variety of designs, including pilasters, gas-pipe columns, specimens of store fronts, designs of stairways, cuts of lampposts, hitching-posts and railings; sections of beams, channels, angles, tees, octagon columns, &c.; designs of riveted girders, flitch-plate girders, &c; cuts of iron roofs and frames; cuts of fire-proofing construction; coal-hole covers and sidewalk lights, and numerous rules for working out problems arising in the construction of buildings and structural work generally. A complete index affords ready reference to any subject. The book is well printed on good paper and very substantially bound.

GUIDE TO THE CONSTRUCTION OF GOTHIC DETAILS. By F. Roesling. 25 plates. Published by William T. Comstock. Price, $3.

As indicated by its title, this work seeks to show, in a brief yet comprehensive form, the construction of Gothic details. The object of the author has been to supply details, especially adapted for enlarging or reducing the proportions without great risk of losing design or time in construing or carrying out details. A rule of construction for every detail is given, which permits of no modification of geometrical lines. The matter is so arranged as to enable beginners and artisans, as well as draftsmen, architects and builders, to study the fundamental rules of the Gothic style without great loss of time.

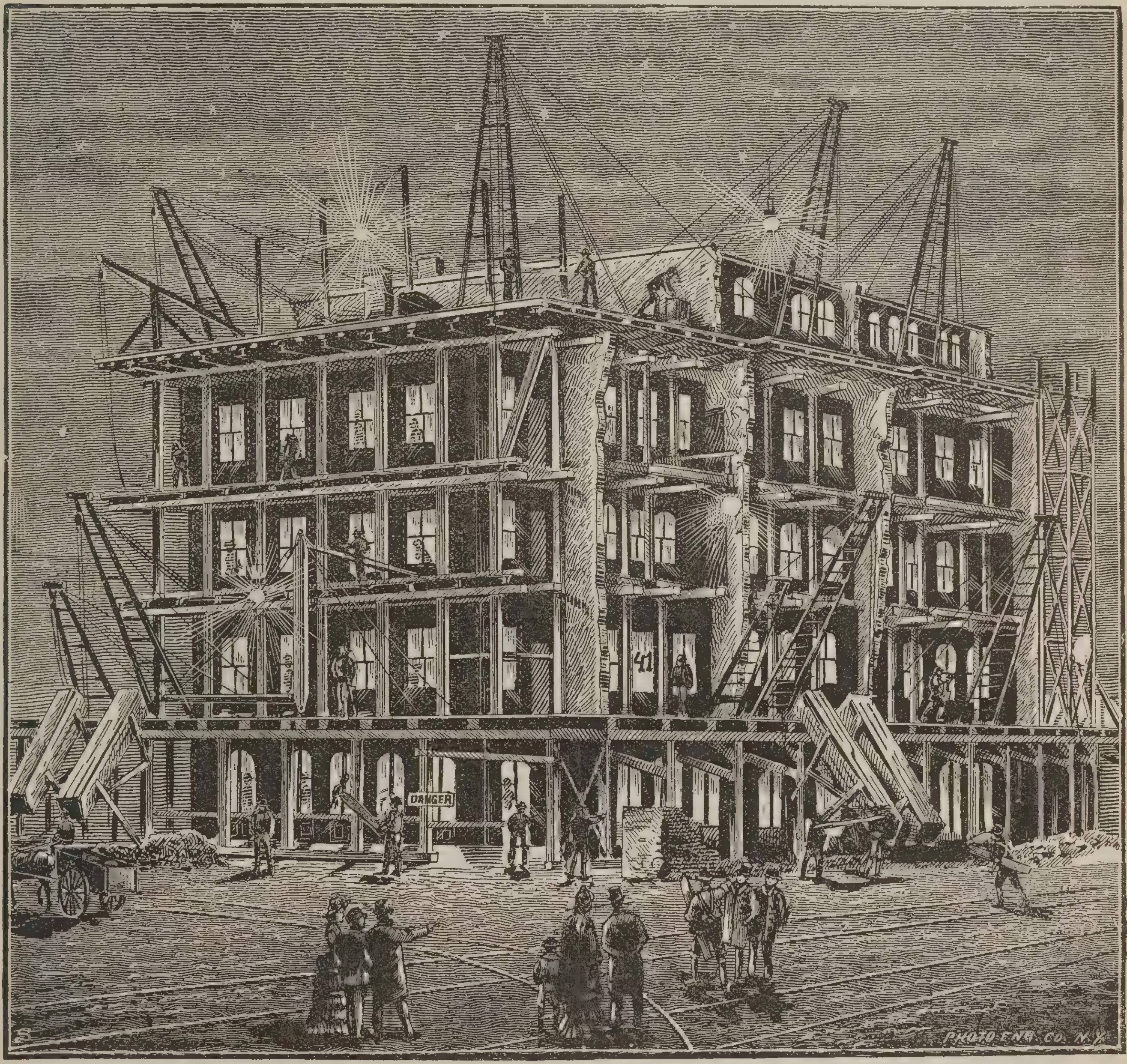
THE PLATES.

We devote our four Plate pages this month to studies in schoolhouse architecture, being selections from plans that were submitted in the competition conducted by Hon. A. S. Draper, Superintendent of Public Instruction of the State of New York, some time since. We gave full particulars of this contest in our issue for February last, to which we refer the readers for additional particulars. In connection with what is now published we give the names and addresses of the authors of the designs. We present altogether five studies out of a much larger number that were submitted in the contest. The subject is one of general interest, and in thus laying the several designs before our readers we are serving them in a way that, no doubt, will be highly appreciated.

The "Times" Building.

The visitor to New York at this time who strolls about in the neighborhood of City Hall Park and the entrance to the Brooklyn Bridge cannot fail to have his attention drawn to the peculiar appearance presented by the *Times* building. For some weeks past the lower part of it has been surrounded on three sides by a staging or scaffolding covering the sidewalk and built of massive timbers. The outer walls have been gradually disappearing, being reduced stone by stone. Instead of the building being torn down, as buildings ordinarily are torn down preparpants of the building moved out to accommodate the builder. The printing presses and other machinery of the *Times* newspaper are located in the basement and sub-basement, and still stand in their original positions. The first floor along the front shown in the engraving was occupied by the *Times* as a counting-room, and the space is still utilized for this purpose, losing, however, a little of its width, as will appear further on. In the stories above were located the editorial rooms composing rooms, &c., and these remain substantially as they were at the beginning. The *Times*, as a newspaper establishment, therefore, still We have thought the matter of sufficient interest to lay before our readers. We will give a brief account of the way in which the work has been conducted, prefacing our remarks by mentioning that George P. Post, who has had charge of many large business buildings in the lower part of New York, is the architect in charge, and D. H. King, Jr., is the contractor for the new building.

For more than three months prior to the time when the general occupants of the building gave up their offices the work had progressed in an unobtrusive manner below the sidewalks. The foundations for the new building were put in place



Alterations in the "Times" Building, New York. Night View, Showing Method of Working.

atory to erecting a new building on the same site, the problem has been undertaken of removing the old building, so far as necessary to the construction of a new one, while yet the old one stands and is occupied. The work in some parts has been in progress since about the first of the year, but the tenants in general did not vacate the building until the 1st of May. In the interval, between the 1st of May and the middle of June, the building assumed the appearance indicated by the accompanying engraving, which, as the caption indicates, is a night scene. The work since May 1 has progressed night and day, the electric light being used at night. As already intimated, only a part of the occuoccupies the building, and has not been materially discommoded. Some of the floors of the old building will remain just as they were in the old structure, as parts of the new building when it is completed. To replace a seven-story building, which indicates what the old building was, with another of modern construction about double the hight, without disturbing a tenant who occupies several floors of the old building, is a feat which, we believe, has never been undertaken in America, and, it is claimed, has never been successfully accomplished in Europe. This is exactly what the management of the *Times* has set out to do and what is now in rapid progress, as indicated by the engraving. below the footings of the old walls, working in only a small space at a time and carefully shoring up for the purpose. The only visible evidence of this preliminary work to the thousands who passed the building each day lay in the numerous barrels of cement and large piles of neatly stacked bricks which occupied positions close to the curbs and which, it was to be noticed, were gradually taken below the surface and used. By this enterprise an important saving of time in the completion of the new building was gained. On May 1 a gang of workmen began building a stout wooden bridge at a hight of some 14 feet from the sidewalk, extending from the southern end of the building on Park

Row and Nassau street to Printing House Square and across the northern front. For the benefit of the reader we will mention that the northern front of the building, as above described, is in the foreground of the picture. This bridge extended from the walls of building outwardly to a point two feet beyond the curb. It was composed of heavy, well-seasoned timber, supported on 12-inch square columns of Georgia pine, and, by its very strength and massiveness, attracted marked attention. This bridge was constructed for the purpose of insuring the safety of people who were continually passing the building, and also to afford a platform on which the workmen could work in perfect security and without interruption in handling the different parts as the walls were taken down. It was made strong in order to carry the piles of stone and brick and building a new set of walls several feet inside of the old walls to carry the floors. The old building was fire-proof in construction, the floors consisting of I-beams with brick arches sprung between. The removal of the outside walls laid bare the ends of the iron beams and revealed also the brick arches; some of these are to be detected by close examination of the engraving. What has been accomplished therefore, to date, is that the old building has been removed and a temporary building built inside of its wall lines, the new inclosure being several feet less in dimensions than the old. This, however, applies to three sides only of the building, the fourth standing against the Potter Building, a very tall structure recently completed, requiring no such treatment. We have already referred to the preliminary work that was done under the sidewalk While the old *Times* building was seven stories high, and in all particulars was one of the most substantial buildings in the city of the style and construction in vogue 30 or 40 years ago, it has been outgrown. The change that is taking place simply brings it up to date, and is a striking example of the architectural changes to which New York is liable. The engraving presented in this connection, as already mentioned, represents a night scene, which, by the way, is most impressive for the casual observer. We are indebted to the *Times* management for it, and it is the same as appeared in the issue of that paper June 10.

A NEW GLUE SIZE for affixing wall paper, much cheaper and more suitable than the old kinds, is thus produced: Dissolve in a copper pan, heated by indirect steam, 44

Design for Brick House. By J. G. Proctor, Wingham, Ontario.—Front Elevation.—Scale, ⅛ Inch to Foot.

other material necessary, and has been used about as the ground would be used around a building erected under ordinary conditions. It became the foundation of the derricks used in lowering material and left the sidewalk for the use of the public. The building is located where it would be difficult to spare the sidewalk, so great is the number of people passing daily. With the bridge completed and the derricks in position the walls of the building were reduced stone by stone, lowered to the bridge and from the bridge, in turn, lowered onto trucks and then hauled away. The stone of which the old walls were built is of the very best quality of Nova Scotia sandstone, and it is to be said to the credit of this material that it is found in perfect condition after 30 years of use and exposure to the atmosphere. While the walls were being removed in this way other workmen took off the roof and a little later substituted a temporary structure therefor. Still another gang at the same time was employed in shoring up the several floors of the building, virtually and out of sight. The new foundations have been most carefully prepared, inverted arches have been freely used to properly distribute the weight and in many respects very much more has been done with the old building in place than many builders and contracters would suppose is possible. At the present writing the outer walls of the new structure are about up to a point to make their appearance above the sidewalk, and in a short time the new building will begin to show, standing on the site of the old. As the walls progress the connections with the several floors will be made, and when all is done it will be hard to believe, from inspection at least, that such a change as we have described has taken place.

The occasion for this alteration is the desire to build on the *Times* site, which is one of the most valuable pieces of property in New York City, a building of several times the capacity of the old one. Tall buildings are at present the rule in the lower part of New York, and the new structure will have no less than 13 stories.

pounds of soda with 198 pounds of boiling water, adding, while constantly stirring, 308 pounds of powdered rosin, still stirring. The rosin will be dissolved in three or four hours. The soda-rosin composition is mixed together with a glue solution of 110 pounds of glue with 30 pounds of water. Both solutions are to be boiled together for about ten minutes, after which the mixture is run through a fine sieve or filter, and is then ready for use.

KANSAS MAN (just settled in Omaha).—Whew! It's lucky I found you in. The man who built that house you sold me made a terrible blunder. It's a mercy we're any of us alive, and I think he ought to fix it at his own expense. There's neither sense nor law in such workman ship.

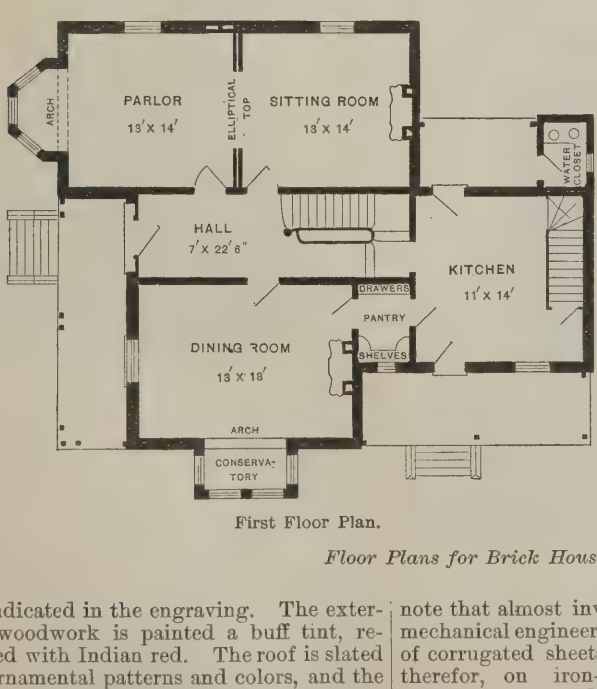
Real Estate Agent.—You amaze me. What's the matter?

"Why, sir, the drain pipes from the roof lead directly into the cyclone cellar, and it's half full of water."—*Omaha World.*

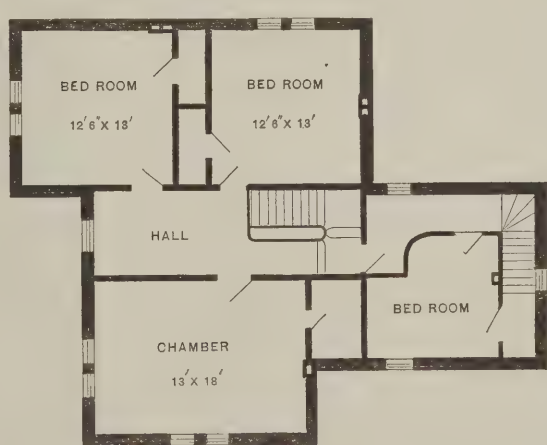
Brick House.

The accompanying study in brick architecture was prepared by John G. Proctor, of Wingham, Ont., some time since. The house shown was built in the town named, and presents an attractive appearance, thus warranting the study a place in our columns. The walls are of light-colored brick, relieved with black and red belts, as indicated in the engraving. The exterior woodwork is painted a buff tint, relieved with Indian red. The roof is slated in ornamental patterns and colors, and the work was executed for $3000.

Design for Brick House.—Side Elevation.—Scale, ⅛ Inch to the Foot.



First Floor Plan.



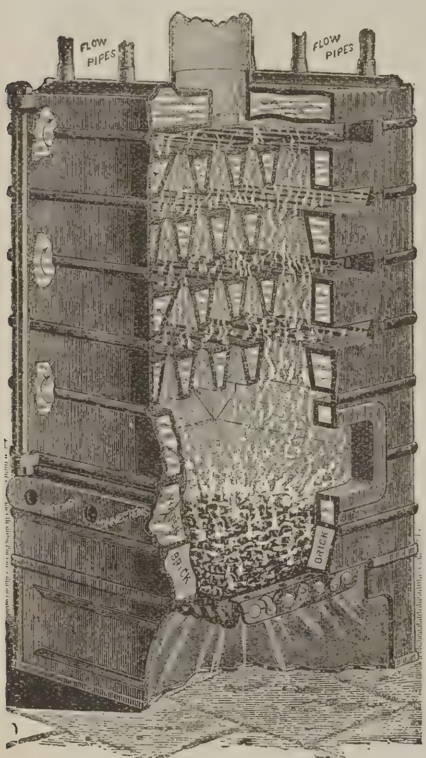
Second Floor Plan.

Floor Plans for Brick House.—Scale, 1-16 *Inch to the Foot.*

WE ARE INDEBTED to Mr. J. G. Battelle, secretary of the Cincinnati Corrugating Company, of Cincinnati, Ohio, for a copy of a letter which he has recently sent out to builders, mechanical engineers, and others connected with building, relating to spacing roof work for the reception of corrugated iron. It contains suggestions which will be found of interest to all roofers. We make the following extract: "First inviting your attention to the fact that the regular lengths of corrugated iron which we carry in stock are 5, 6, 7, 8, 9 and 10 feet, we note that almost invariably architects and mechanical engineers, in specifying lengths of corrugated sheets, or spacing supports therefor, on iron-framed roofs, name lengths which are different from those carried in stock, obviously necessitating delay and often greater cost, as in such cases the required lengths must either be rolled specially or cut from stock lengths which are carried by all the larger makers of corrugated iron. We judge that in planning disposition of purlins or other supports for the corrugated sheets, the rule seems to be to place them equally distant between centers. But why would it not be as well, from any standpoint, or better, for reason previously indicated, to plan to use regular lengths, not necessarily using one length only on each roof, but any regular lengths, or such as can be cut therefrom with least waste? There is far more corrugated iron now used on wooden than iron framing, and the use generally of corrugated iron is very largely increasing; hence, considerable stocks of regular lengths and of the different gauges (Birmingham-Haswell) are kept at different points throughout the country, we having to-day over 1500 tons in stock."

Steam and Hot-Water Heaters.

The increased demand for hot-water heaters is manifested in the number of new heaters which are being put upon the market. Richardson & Boynton Company, of 232 Water street, New York, manufacture the Perfect hot-water heater, a broken view of which is shown in Fig. 1. The general features of this apparatus are so distinctly shown in the cut that but little descriptive text will be necessary to a full understanding of it. The heater is of



Steam and Hot-Water Heaters.—Fig. 1.—The "Perfect" Hot-Water Heater.

the sectional type, made of cast iron, the different sections being held together by long bolts, as indicated in the engraving. The fire-pot, which is adapted to burning either hard or soft coal, is made with rounded corners, and is of sufficient depth to insure perfect combustion at all times. It is operated by a lever, and on account of its peculiar construction is said to clear the grate thoroughly from ashes with the least possible exertion. It will be noticed that the cast-iron sections are composed of hollow cross-bars of trapezoid shape, the inclined sides of which prevent the accumulation of dirt and dust. The bars in the different sections are staggered so that the ascending currents of hot gases impinge directly against the surfaces. The manufacturers state that it is the only square sectional hot-water heater made, and has fewer joints than any other apparatus of the kind, besides not requiring an brick-work. All the parts of the heater are readily accessible, so that they may be cleaned with little difficulty. The heater is in continual circulation in small bodies from the time it leaves the heater, passing through a number of horizontal sections above and around the fire, all of which are exposed to the direct flames, thus fully utilizing the products of combustion. The heater being sectional, it can be readily taken apart and set up quickly, and the further advantage of this form is that it can be placed in a building without necessitating the enlargement of doorways or windows. The Perfect hot-water heater is to be made in eight different sizes, adapted to a radiating surface of from 200 to 4000 square feet, the heating surface in the heater varying from 28 to 175 square feet. The manufacturers state that these heaters have been in use during the past three years with very satisfactory results, having been erected in buildings in all parts of the country.

In addition to the hot-water heater made by the Richardson & Boynton Company, the same manufacturers are putting upon the market the Perfect warm-air and steam heater and the Perfect warm-air furnace, combining a hot-water generator. In Fig. 2 a broken view is shown of the Perfect warm-air and steam heater, which has been constructed with special reference for meeting the existing demand for hot-water apparatus, which shall combine the principles of heating partially with warm air and partially by steam. It is said of this combination heater that it is easily managed and controlled, and is adapted to heat almost any building, besides being less expensive than a steam heater alone. The manufacturers point out that the amount of heating can be readily controlled, for in mild weather the fire may be kept so low that no steam is generated, and the house is heated simply by warm air in the usual manner. The boiler, a portion of which is shown in the cut, is made of wrought-iron plate, welded and riveted, and is tested to 150 pounds pressure. The safety valve, however, is set at 5 pounds, so that there is absolute immunity from danger. The boilers, which are pierced with vertical tubes, are placed inside the furnace and

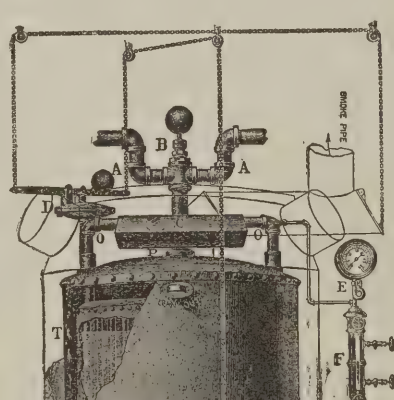


Fig. 2.—The "Perfect" Warm-Air and Steam Heater.

directly over the fire, so that all the products of combustion travel through it and at the same time heat the fire-pot and body of the furnace, and thus produce the warm-air supply. A clean-out door, as shown in the front of the cut, is provided, through which the top of the boiler may be readily cleaned. Referring to the letters in the cut, A A show main steam-pipe connections and G main return pipe con-

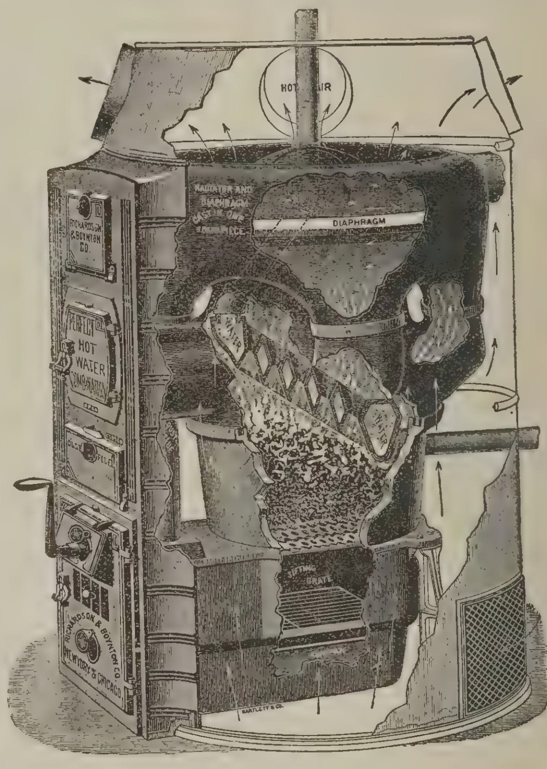
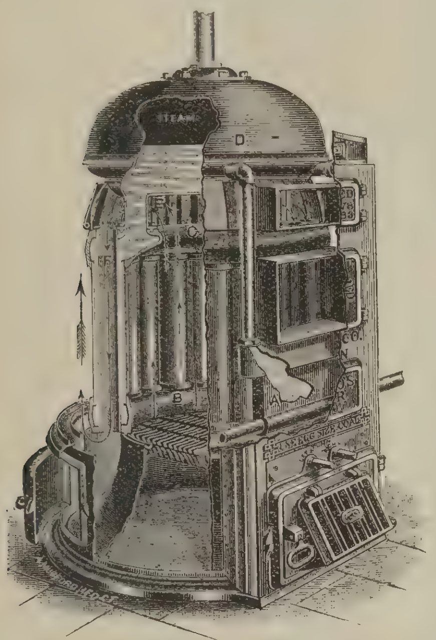


Fig. 3.—The "Perfect" Warm-Air and Hot-Water Furnace.

nections. A steam drum is provided at C and connected with the boiler at the pipes O O. The combination heater is made in four sizes, with boilers varying from 22 to 34 inches in diameter. Another heater known as Richardson & Boynton Co.'s 1888 Perfect warm-air furnace, combining a hot-water generator, is illustrated in Fig. 3. The furnace in this case is the well-known warm-air one made by the above firm. Within the fire-pot, however, and just over the coals is a cast-iron boiler section set on an incline, the form of which is illustrated in the engraving. It will be noticed by this arrangement of the boiler within the fire-pot that the capacity of the furnace for heating the air is not reduced. The flow-pipe issues from the top of the furnace and the return comes in on a level with the fire-pot, as shown at the right of the cut. It is claimed for these combination furnaces that their warm-air capacity is not lessened and that, in addition, the water will supply 150 to 175 square feet of radiators in rooms where it is difficult to force the warm air. This radiator capacity is about equal to two or three ordinary rooms.

The rapid advance in house-warming appliances and a desire to meet every new condition of the trade, has induced the Richmond Stove Company, Norwich, Conn., to purchase from the Victor Heating Company its entire property and patents. Figs. 4 and 5 present broken views of the improved form of this heater as it is now put upon the market by the Richmond Stove Company. The Victor heater is constructed wholly of cast iron and is said to possess all the requisite strength, the boiler being tested under cold-water pressure to 60 pounds to the square inch. The boiler, however, is low pressure and adjusted to blow off at 6 pounds, being equipped with a simple and reliable safety valve; also with an automatic draft regulator to control the fire. In the construction of the boiler it is provided that no portion of its surface escapes the direct action of the fire upon the water, which is divided into thin sheets or columns in

such a manner as to permit the same to pass in perpendicular lines to the surface, and at the same time secures a rapid circulation of the water, which is necessary if the best results are to be obtained. Special attention is directed by the manufacturers to the simplicity of design. The portable form of the Richmond Victor heater, illustrated in Fig. 4, shows the heater ready for its connections, with its cast-



Steam and Hot-Water Heaters.—Fig. 4.—Richmond's Victor Steam Heater.

iron front or shield, with the ash-pit, feed and clean-out doors; also the base, with the series of doors opening into it, affording easy access to the bottom and outer flues and the boiler-tubes for cleaning purposes. Several openings for the steam-pipes are provided in the steam dome, greatly facilitating connections. Every heater is sold with a complete set of trimmings, such as the automatic draft regulator, safety-valve, steam-gauge, water-gauge, &c.; also a flue-cleaner, made especially for it. Referring to the letters in Fig. 4, A shows the water front and its

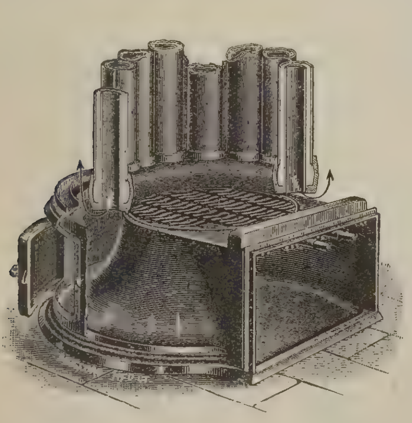


Fig. 5.—Richmond's Duplex Grate.

connection with the dome, also the pipes for the return and feed connections in its setting. By the arrangement adopted the supply of cold water becomes heated before entering the boiler, and this is spoken of as an especial merit of the apparatus. B shows the fire-pot formed by a circle of double tubes, with water occupying the space between each inner and outer tube, thus presenting a thin annular column of water. The products of combustion pass upward, as indicated by the arrows, and impinge against the crown C and along the surface of the dome D; thence outward between the tubes E, which connect the dome and the fire-pot sections, thence down through inner tubes F and finally upward between the inner casings or wall and outside of boiler to the exit. These inner casings are of cast iron, made in sections and laid together in asbestos cement and securely bolted, so as to prevent any possible escape of gases. The outer casings are made of galvanized iron. Fig. 5 illustrates Richmond's duplex grate, for which special advantages are claimed. Its operation is said to be simple and effective, rendering unnecessary the use of slicing bars or pokers and reducing the labor of clearing the fire-pot and removing ashes and cinders to a minimum. By the revolution of the bars, which is accomplished by means of a lever, an even slice of ashes or cinders may be removed from the bottom of the fire-pot, letting the coals above fall vertically and evenly. The ash-pit is of large proportions and it is said that only the greatest negligence will occasion any trouble with the grate.

We illustrate in Fig. 6 the Improved Low-Down Combination Steam and Warm Air Heater recently put on the market by the J. F. Pease Furnace Company, of Syracuse, N. Y. The cut shows the apparatus with a portion of the casing and combustion-chamber broken away so that its internal construction may be understood. A late catalogue issued by the Pease Company states that, although the heater has been in use for some time past, it has hot been noticed in any previous catalogue, as the company wished to submit it to a thorough practical test before pushing its sales. After a successful trial of two winters the manufacturers feel that the satisfactory results that the heater has given warrants them in recommending it to the trade. This Low-down pattern of the combination heater, while possessing all the salient features of the regular pattern heater, which the same company have manufactured during the past seven years, differs somewhat in general construction. The combustion-chamber and steel boiler inside are larger in diameter and not quite as high as the corresponding parts of their regular pattern combination heater. The warm-air radiator, which surrounds the fire-pot immediately under the cast-iron flange supporting the chamber, is made of iron (cast in one piece) and is securely fastened by cup joint to the flange elbows. The products of combustion ascend through the flues of the boiler and around the sides of same to the top of the combustion-chamber, and thence downward, as indicated by the course of the arrows, and deflected by the shields into the radiator surrounding the fire-pot. From there they pass to the smoke-flue by the indirect draft-pipe. When building the fire the direct draft-pipe is used by turning the damper in the pipe, which permits a direct exit for the smoke and gases to the chimney. The construction admits of a free circulation of the air, entering through the cold-air duct. It circulates in the warm-air chambers, between the warm-air radiator and the fire-pot, and upward between the outside of the combustion-chamber and casing. Attention is also directed to the fact that the course for the products of combustion is not only circuitous, but also partly downward, thereby retarding their escape until nearly all the heat is abstracted. The casing of the heater is made of best quality galvanized iron and is provided with an inside heavy tin lining which prevents the radiation of heat in the cellar. The heater can be provided with the company's regular anti-clinker flat grate or the McClave rocking and dumping T-grate, which the company own the right to manufacture. Both are easily, partially or wholly dumped. The heater is automatically regulated by the steam pressure on a diaphragm. The heater includes the steam and water gauges, safety-valve, try-cocks, diaphragm regulator casing complete, ready to at-

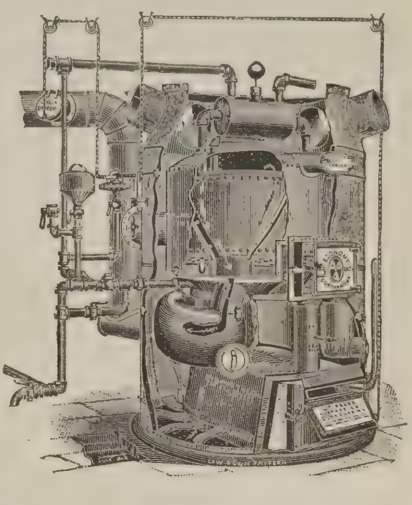


Fig. 6.—The Pease Low-Down Combination Heater.

tach steam, return diaphragm and warm-air pipes. It is manufactured in three sizes, Nos. 10, 14 and 18, of about 70, 74 and 78 inches in hight respectively. The Pease Company claim the steam generating power of this apparatus to be greater than that of the regular pattern combination heater, while the power for producing warm air is about the same, and while they are especially designed for low cellars that would not admit the setting of the regular pattern heater, many of them have been placed in high cellars of buildings which demand a large amount of steam heat. The company also manufacture this pattern with special high boilers when an unusually large steam-power is required.

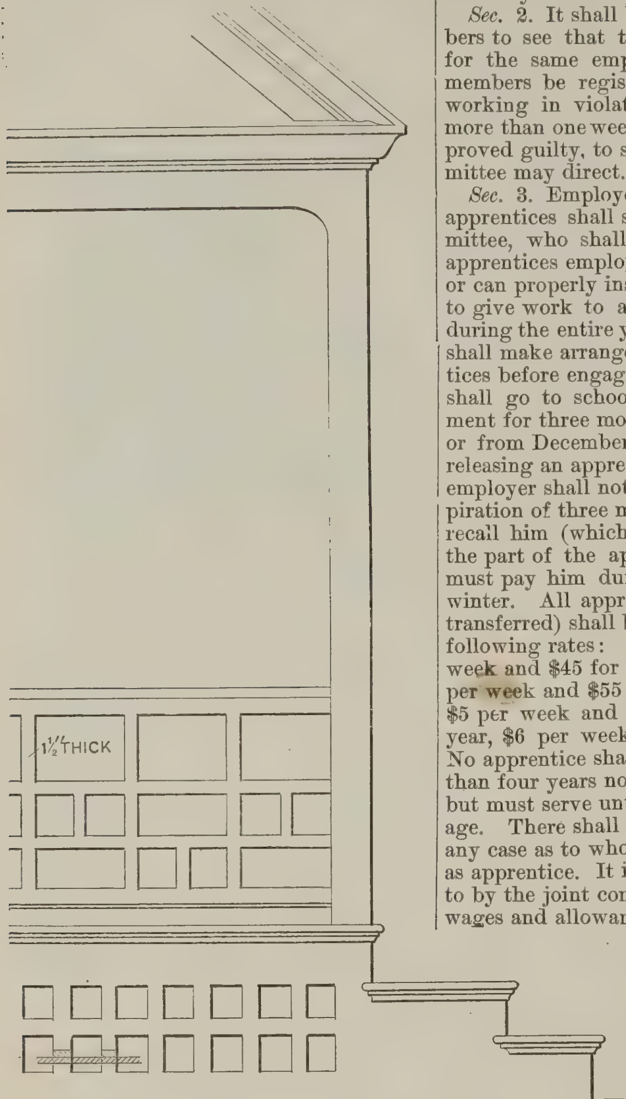
Decorative Treatment of Walls.

The modes of treatment of walls, whether on dado, frieze or wall space, are multiplying. This is a good sign, as leading, at all events, to various departures from the ordinary course. Some of these allow play for manipulative skill in molding as well as for the brush of the painter. Many compositions of a plastic character are brought forward designed to supersede wall paper, or to supplement it. Such differ mainly in their composition, whether intended to present irregular surfaces, to have figures fashioned by a tool in the hands of the workman, or directly molded from a die. Almost any material, ground up and pressed and brought into a pasty consistence, with its particles held together by some glutinous substance, will serve to operate upon. The composition must present on drying a hard surface. Other materials, like Lincrusta, are beforehand pressed in sheets and molded, requiring only to be shaped and attached with glue to the surface of the wall. When it is placed on the wall in a plastic state for designs to be worked out upon it with a tool or tools, it is of the first importance that the material should not harden too quickly, in order that full time may be afforded to carry out the design to a finish.

Paper pulp, glue, linseed oil and carbonate of lime or whiting provide an excellent material for molding of relief work on walls. The designs are attached with glue, and admit of either oil or water painting.

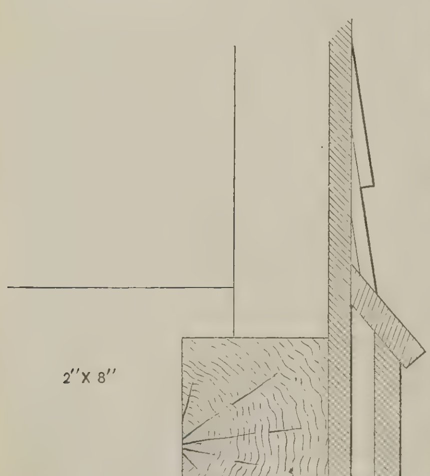
Bricklayers' Apprentices.

A short time since the Master Bricklayers' Company and the Journeymen Protective Association, of Philadelphia,



Details of Piazza.—Scale, ½ In. to the Foot.

adopted, through a general committee, rules regulating wages and work, and governing apprentices. The rules minutely define the relations of apprentices to their employers and to the journeymen. The



Section Through Sill and Water Table.

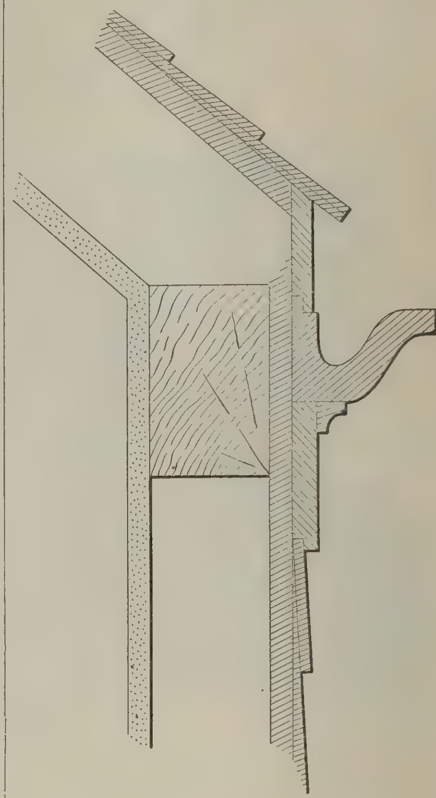
general subject is likely to be of interest to our readers, and accordingly we present the matter in full herewith:

Section 1. The names of all apprentices within the jurisdiction of the associations represented by this joint committee, together with their age, date and term of apprenticeship, and name of employer, shall be registered in a book to be kept by the secretary of this committee, said book to be styled the Apprentices' Register.

Sec. 2. It shall be the duty of all members to see that the apprentices working for the same employer or firm, as said members be registered, and any member working in violation of this section for more than one week shall be subject, when proved guilty, to such penalty as this committee may direct.

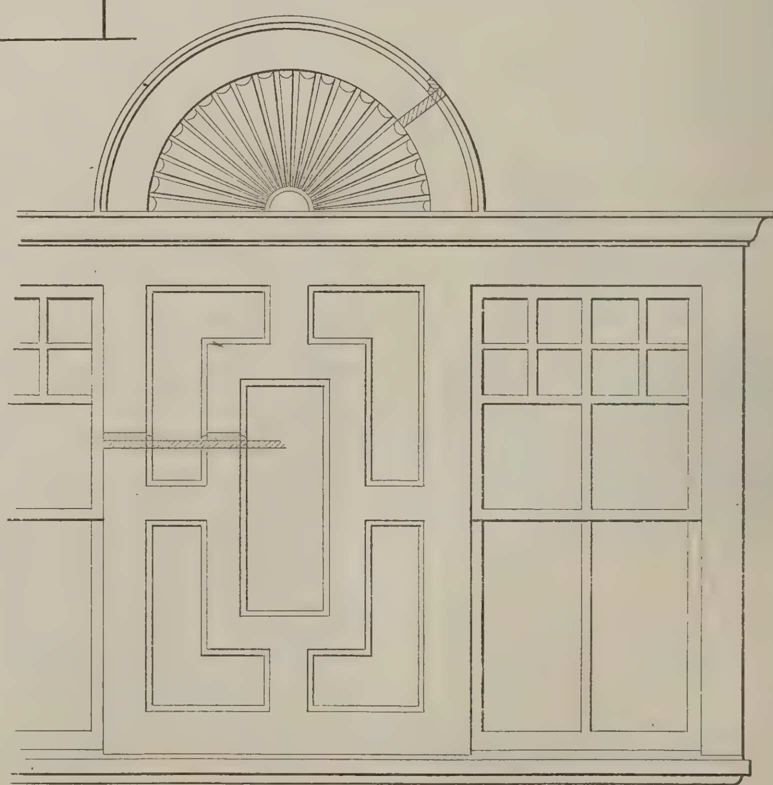
Sec. 3. Employers who desire to take apprentices shall so notify the joint committee, who shall decide the number of apprentices employers shall be entitled to or can properly instruct. The employer is to give work to and pay his apprentices during the entire year, unless the employer shall make arrangements with his apprentices before engaging them whereby they shall go to school or get other employment for three months during the winter, or from December 25 to March 25. After releasing an apprentice for the winter the employer shall not recall him until the expiration of three months, and if he should recall him (which would be optional on the part of the apprentice to return), he must pay him during the balance of the winter. All apprentices (including those transferred) shall be paid according to the following rates: For the first year, $3 per week and $45 for clothes; second year, $4 per week and $55 for clothes; third year, $5 per week and $75 for clothes; fourth year, $6 per week and $100 for clothes. No apprentice shall serve for a less time than four years nor more than five years, but must serve until they are 21 years of age. There shall be no discrimination in any case as to whom an employer shall take as apprentice. It is understood and agreed to by the joint committee that the scale of wages and allowance for clothes shall be subject to change at any time when in the judgment of the joint committee such change should take place, the change to affect all apprentices immediately.

Sec. 4. No apprentice shall be allowed to leave his employer to work for another unless he can prove clearly that to continue with said employer would deprive him of a reasonable opportunity to acquire the trade thoroughly. In which case, if transferred, he shall be given credit with his



Main Cornice.—Scale, 1½ Inches to the Foot.

new employer for such term as he may have served with the old one. In case of any apprentice leaving his employer without due authority his name shall be stricken from the register and he shall forever be debarred from becoming a member of either organization represented by this committee.



Detail of Window in Right Gable.—Scale, ⅛ Inch to the Foot.

Sec. 5. In case of an employer or a firm retiring from business and who may have apprentices working for them, this committee, on receiving notification of the same, shall take action on the matter, and instruct the secretary or some other suitable member to provide him a place to finish his trade, and such apprentice or apprentices shall also be given credit for the time already served on the register.

Sec. 6. The secretary will give to each employer registering an apprentice a certificate signed by the president and secretary of each organization, with the seal of each organization affixed, giving the name, age, date and term of apprenticeship, and with whom apprenticed.

Sec. 7. No part of this law shall be construed to interfere with apprentices who may be working at the trade when this law is adopted, only as far as violation of the law is concerned.

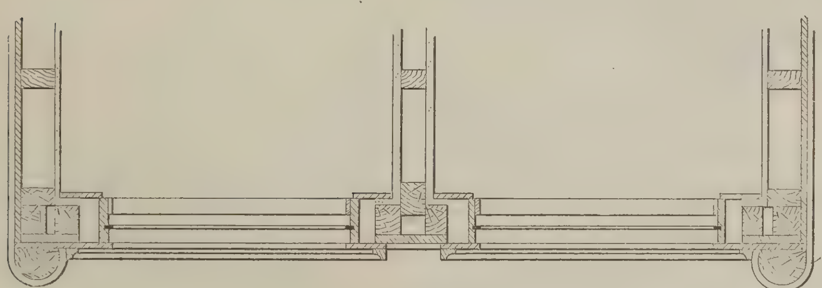
Sec. 8. All persons serving a full and faithful apprenticeship under this law shall be entitled to admission in this association upon payment of one-half the regular initiation fee. In case of any dispute between employer and apprentice in regard to term of apprenticeship, &c., the register shall be considered standard authority, and its correctness shall not be questioned.

Sec. 9. Any employer violating any part of this law shall be subject to such penalty as the joint committee may direct.

Sec. 10. In no case shall a certificate be granted to an apprentice except in the presence of his employer on a regular meeting night of the committee at the hall of the association.

Sec. 11. And no employer or firm will be allowed to take any apprentice, or have any benefit of this law, who is not in business for over two years (except in the case of the employer's own son).

Story and Half Frame House.—Front Dormer.—Elevation.



Plan.—Scale, ½ Inch to the Foot.

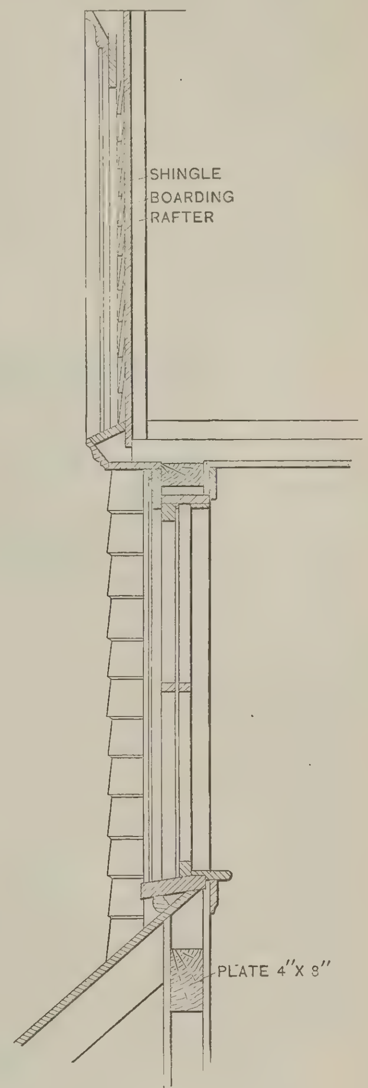
House Details.

On pages 146 and 147 are presented the remainder of the details of the story and half frame dwelling, the perspective view, elevation, plans and parts of the details of which were given in our last issue. The design was prepared by E. H. Hammond, of New York. The details speak for themselves, and, in connection with what has already been published, make a very attractive study.

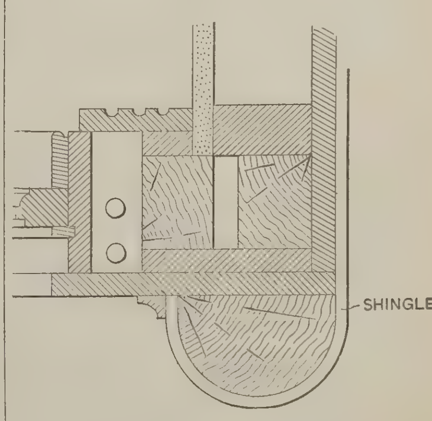
Freemasonry in Mediæval Germany.

Professor Kohlrausch, referring to the architecture of the middle ages, particularly that found in Central Europe, says:

In order to comprehend the origin, and especially the successful execution, of those miracles of architecture, according to one great plan, we must remark that it was not individual architects who, with sometimes good, sometimes bad workmen, as in our times, undertook such works; but they were accomplished by an association of masons, distributed over the whole of Germany—and, indeed, over the whole of Europe—who were bound together by



Vertical Section.



Horizontal Section Through Corner of Dormer.—Scale, 1 Inch to the Foot.

religion, honor and discipline. Even among the Romans there were building societies of great extent, the later members of which retired to the monasteries and there occupied themselves chiefly with the construction of churches and created the more sublime style of Christian architecture. Regular but temporal builders were also received into the society; and when, in the eleventh century, the vigor of the monastic system began to slumber in the indolence and satiety of acquired riches, these temporal builders obtained, by degrees, the superiority, and eventually formed the grand associations, by means of which those wonderful works were executed. They possessed and followed mysterious signs and customs, by which the members of the body forming the class of the more sublime architecture were distinguished from the more simple artisans. Every society had its protecting patron, from whom it was named, and wherever a grand undertaking was to be executed they all came from their various districts and assembled on the spot, so that their art, like a common possession, was beneficially distributed throughout most Christian countries. These important societies received from the reigning emperor and princes letters of license, and even their own exclusive judicial courts, at which the chief architect presided as judge. Close on the spot on which was to be erected the large building they were engaged upon, and which edifice, perhaps, took centuries to construct, a wooden house or *hütte* was generally built, neatly adorned inside, in which the said chief architect, with the sword of justice in his hand, sat under a canopy and pronounced judgment. This *hütte* or court house in Strasburg derived a peculiar importance during the period of the construction of the minster. It was soon regarded as the most distinguished among all in Germany; its institutions were imiated, and the other court houses freuently derived counsel and judgments rom it. After Strasburg came, in 1681, nd er the dominion of France, all connection between this principal *hütte* and the others of Germany gradally ceased to exist, and the consequent disputes which arose between these latter on the subject of each other's claims to superiority were eventually put an end to in 1731 by an imperial decree, by which all distinctions of privilege between these associations and the common class of architects were abolished.

Combined Bench and Tool Chest.

In the accompanying engraving we present a general view of a work-bench and tool-cabinet, being a novelty that has been introduced to the English trade by R. Melhuish & Son, of London, England. As it has many features of interest, we have believed our readers would be pleased with a description of it. It will be noticed that, in addition to the space afforded by the drawers, which occupy the principal portion of the front, a receptacle for tools is provided at either end, inside of swinging doors. In turn the lid is utilized, as is clearly shown in the cut, and only when it is raised is the work-bench brought into view. A vise for holding a board for working on the edge is shown, and also pins for supporting the opposite end of the board. According to the description which has reached us this article, as prepared for the English trade, is made of dark walnut, polished. The doors are finished with self-acting catches. The bench itself is composed of well-seasoned beech, and the drawers have polished brass handles and are divided and subdivided to hold screws, hooks and nails, and the large variety of articles that are required in connection with an outfit of this kind. The statement is made that the whole of the six drawers, two cupboards and top can be instantly closed and fastened with one small lock and key, thus leaving the cabinet in the shape of a very pleasing piece of furniture. There may be a suggestion in this cabinet which some of our readers will work out for their own use.

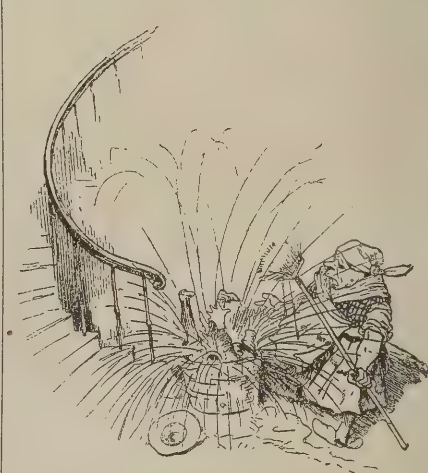
Combination Tool Cabinet and Bench for Amateurs' Use.

Hand Railing.

The subject of hand railing by many of our readers is considered a slippery subject—perhaps not, however, in the way in which it is depicted in the accompanying

Hand railing is a difficult subject for beginners. The problems sometimes appear easy, but——

sketches, which are reproduced from a foreign periodical. The suggestion, however, is appropriate, and we feel certain that many of our readers will enjoy what is herewith presented.



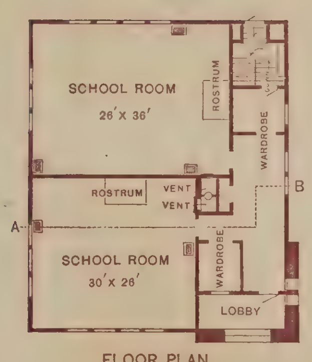
End in disaster.

Quite recently wood hangings have been introduced in Germany, serving as an isolating layer between ordinary wall paper and damp walls. These hangings are made in the form of webs or wickerwork of strips of wood or shavings of North Swedish or Finnish pine, 0.04 inches thick, and 1.17 to 1.56 inches wide, which are said to resist the effects of damp for a number of years. They are manufactured in lengths of 22 to 33 yards, of a width of 2 feet 6 inches to 5 feet, and sold at 33 cents per square yard. The wood hangings are fastened to the wall with galvanized nails, the nail heads being covered with pieces of shavings slipped in, at a cost of about 12 cents per square yard. A covering of shirting is also in this case applied before putting on the wall paper. This wickerwork may be directly used for paneling; the panels are produced by beading, and by leaving the hole in that state, or applying coatings of varnish, or painting the several strips with various oil colors.

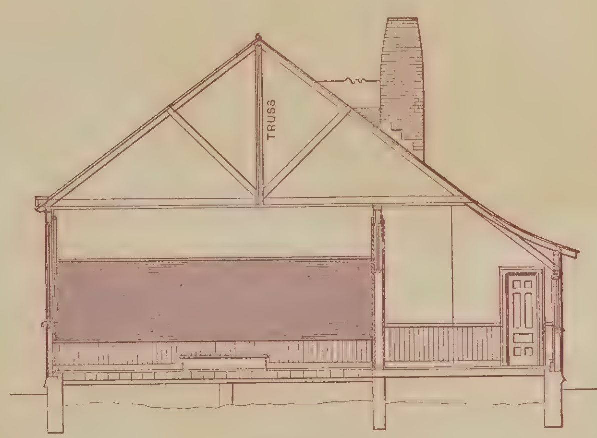
SCHOOL HOUSE COMPETITION, DEPARTMENT OF PUBLIC INSTRUCTION, STATE OF NEW YORK.

PERSPECTIVE VIEW OF STUDY SUBMITTED BY WM. P. APPLEYARD, AND E. A. BOWD, LANSING, MICH.

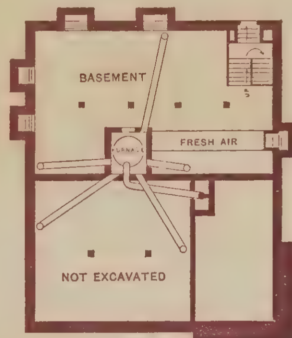
"FIRST PRIZE," ESTIMATED COST, $2500.



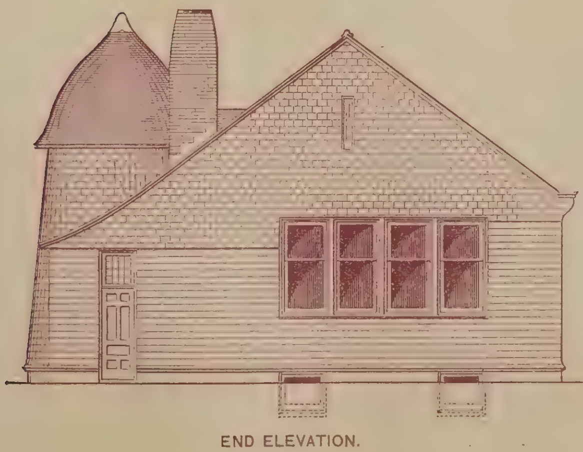
FLOOR PLAN.
Scale, 1-32 Inch to the Foot.



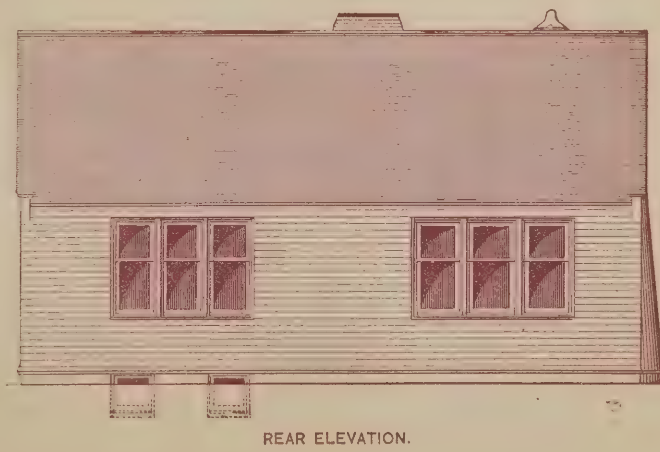
CROSS SECTION.



FOUNDATION PLAN.
Scale, 1-32 Inch to the Foot.

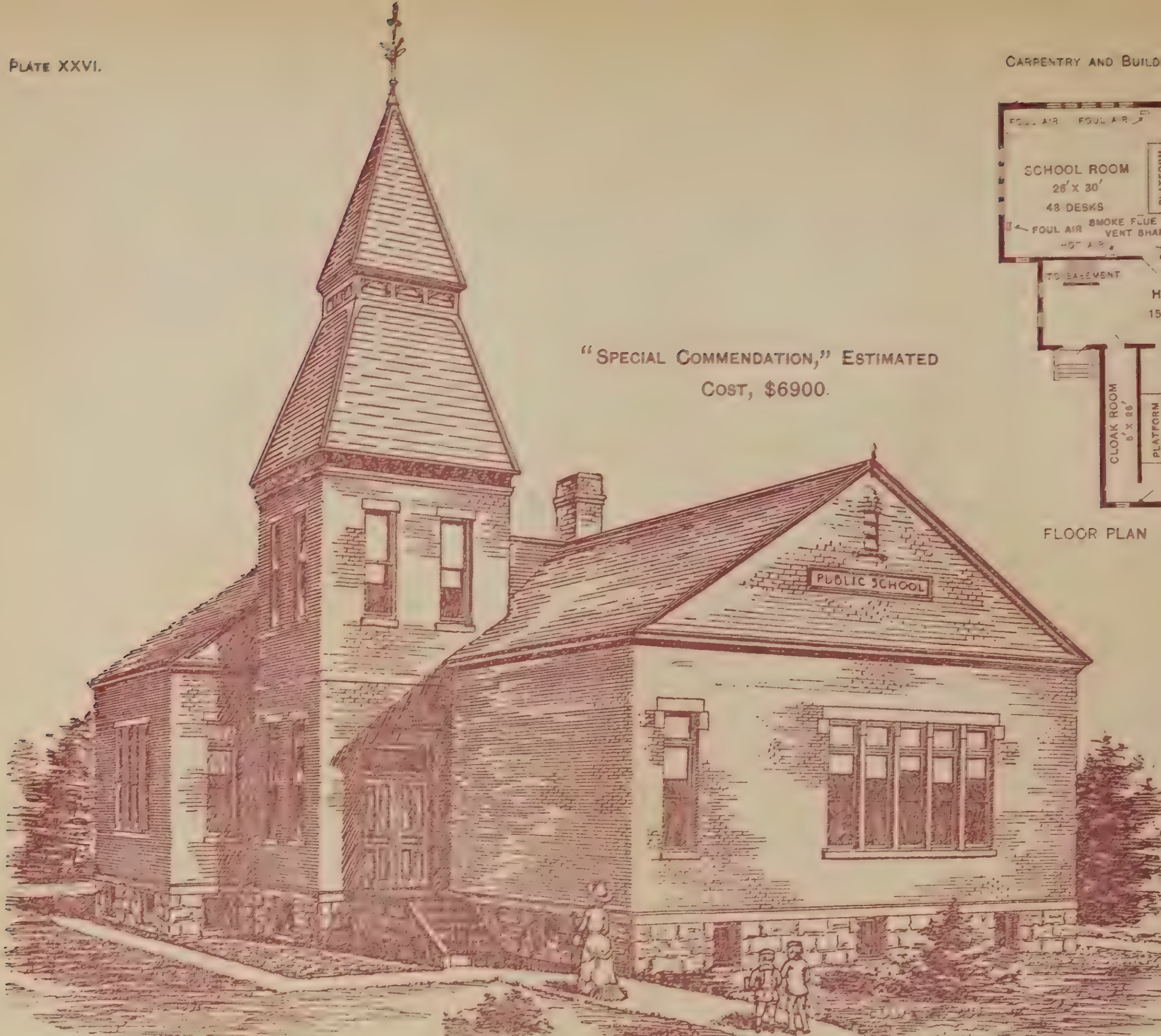


END ELEVATION.

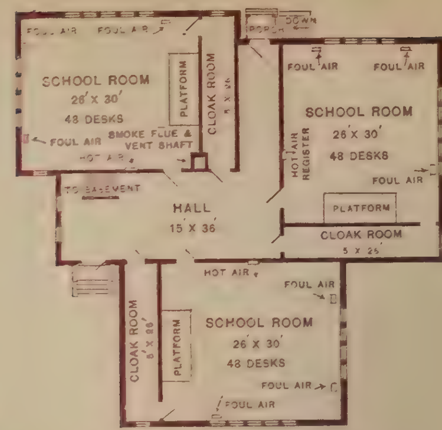


REAR ELEVATION.

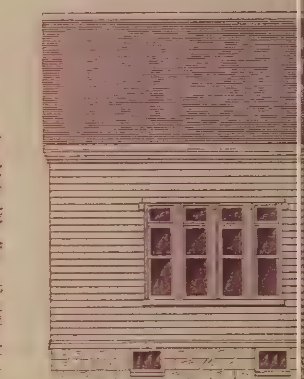
Scale of Elevations and Section 1-16 Inch to the Foot.



"SPECIAL COMMENDATION," ESTIMATED COST, $6900.



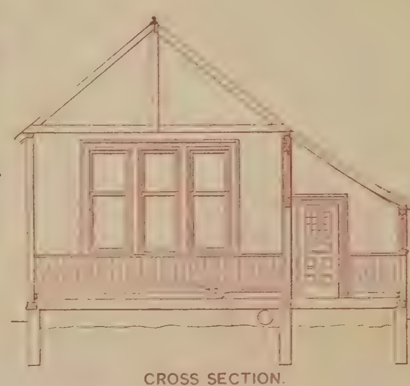
FLOOR PLAN Scale 1-32 Inch to the Foot.



STUDY SUBMITTED BY FENIMORE C. BATE, CLEVELAND, OHIO.

END ELEVATION.

REAR ELEVATION.

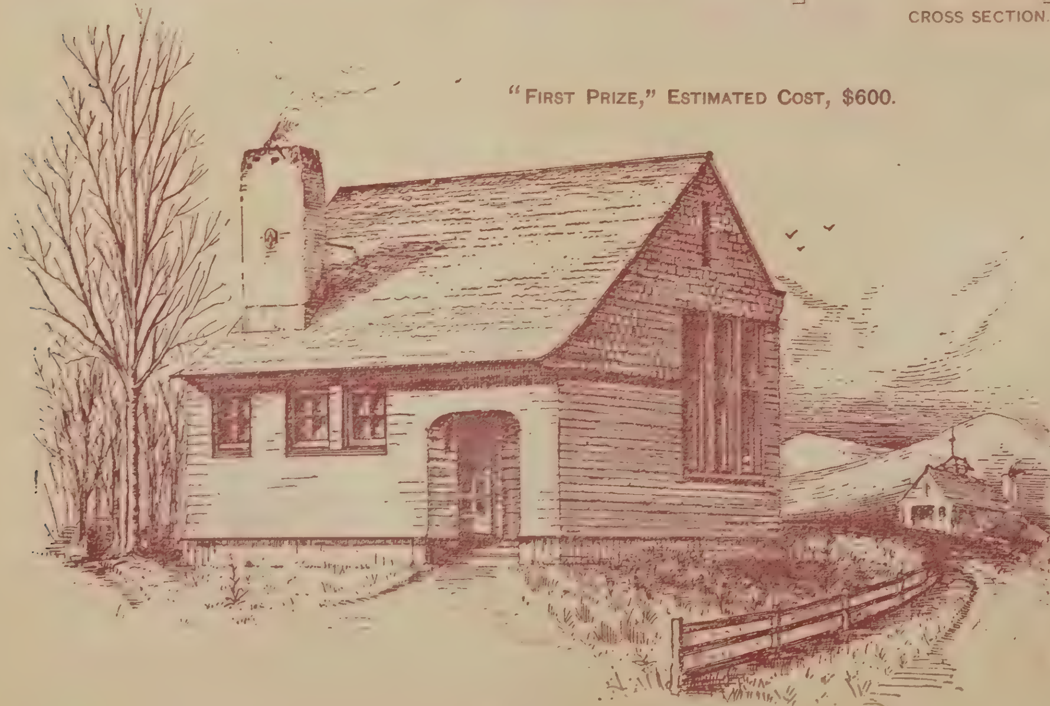


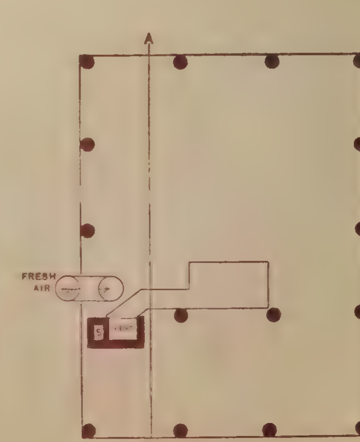
CROSS SECTION.

FLOOR PLAN.

"FIRST PRIZE," ESTIMATED COST, $600.

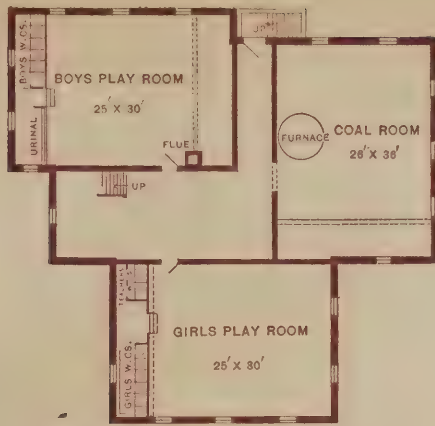
Scale of Elevations and Plans, 1-16 Inch to the Foot



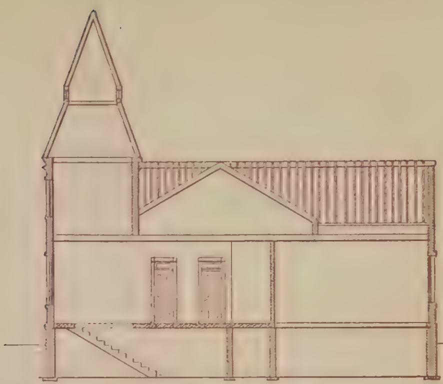


FOUNDATION PLAN.

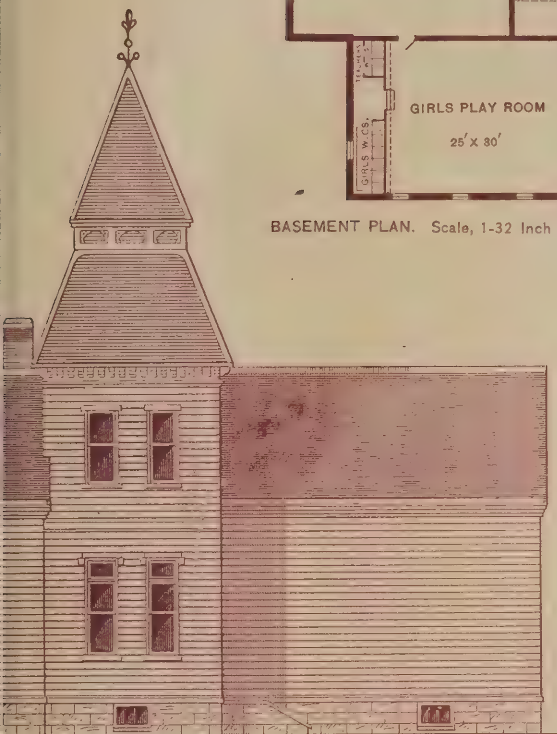
STUDY SUBMITTED BY WM. P. APPLEYARD AND E. A. BOWD, LANSING, MICH.



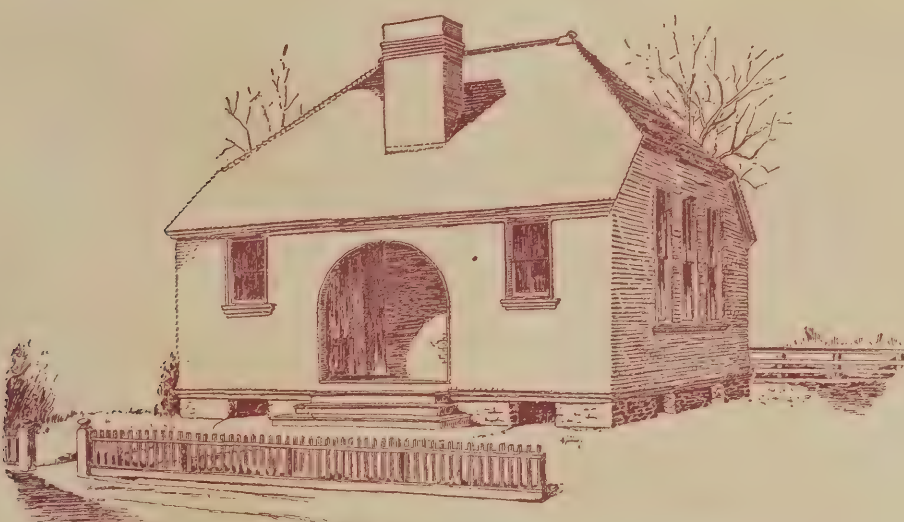
BASEMENT PLAN. Scale, 1-32 Inch to the Foot.

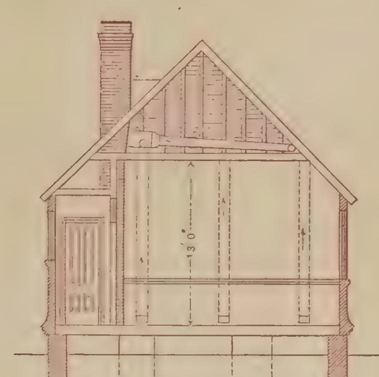


CROSS SECTION. Scale, 1-32 Inch to the Foot.



FRONT ELEVATION. Scale, 1-16 Inch to the Foot. END ELEVATION.



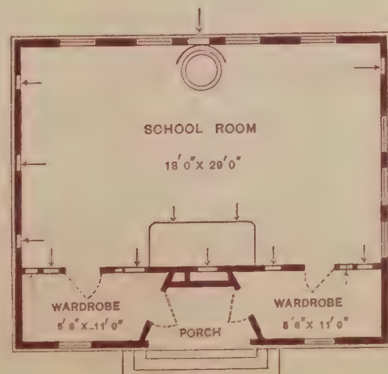


SECTION.

STUDY SUBMITTED BY JOHN R. CHURCH, ROCHESTER, N. Y.

"SECOND PRIZE," ESTIMATED COST, $1000.

FRONT ELEVATION.

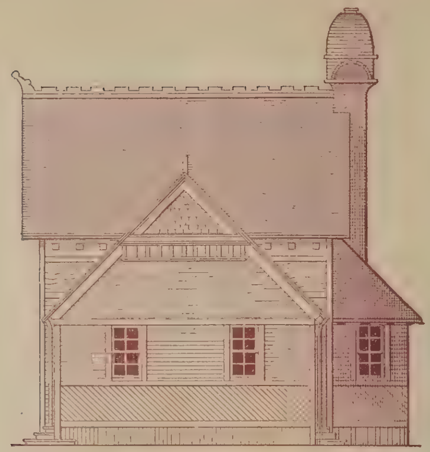


PLAN.

END ELEVATION.

Scale of Elevations, Section and Plan, 1-16 Inch to the Foot.

FRONT ELEVATION.

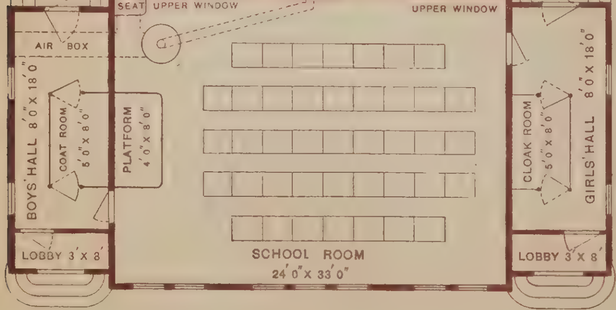


END ELEVATION.

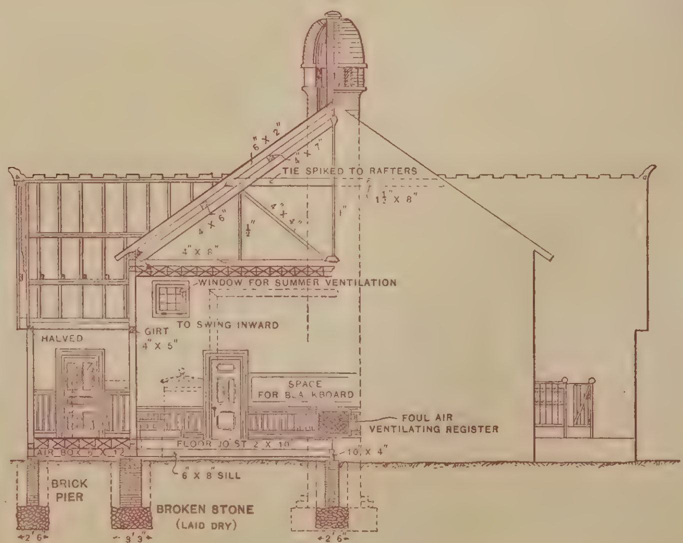
Scale of Elevations, Section and Plan, 1-16 Inch to the Foot.

STUDY SUBMITTED BY C. POWELL-KARR, NEW YORK.

"SPECIAL COMMENDATION," ESTIMATED COST, $1200.



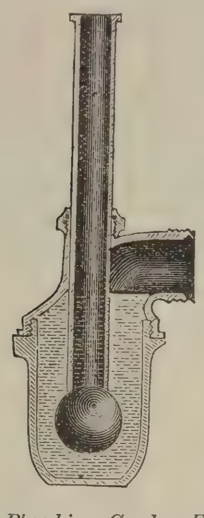
FLOOR PLAN.



LONGITUDINAL SECTION.

Some New Plumbing Goods.

The Bower sewer gas trap is an article that has been extensively used in this country, and the large trade that is being done in them is strong testimony to their value and excellence. The common form of the trap has often been illustrated, and needs no reference here; some new forms of it, however, and other specialties have recently been brought out by B. P. Bower & Co., Cleveland, Ohio, which we will briefly notice. There are three combination styles of the Bower trap at present on the market. Fig. 1 shows



Some New Plumbing Goods.—Fig. 1.—The Bower Single Combination Trap.

the single combination trap designed especially for patent overflow or standing waste wash-basin. All the parts of the trap, except the cup, are of brass, and the latter is made of brass, lead or glass, as may be desired. When polished it is an ornamental article, and is therefore suitable for open work. The outlet is either threaded for coupling or finished for lead connection, and the inlet is adjustable, by which means the depth of the water seal may be regulated. With this trap either the Bower basin plug, Fig. 4, with removable strainer, or the ordinary plug can be used, the inlet-pipe to the trap taking the place

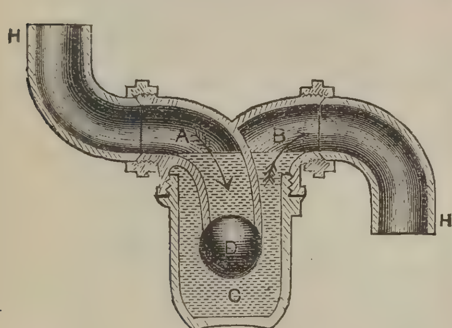


Fig. 2.—The Bower Universal Trap with Cup Below.

of the short tail piece. In Fig. 2 there is presented a sectional view of the Universal Bower trap, which is made in sizes of 1¼, 1½ and 2 inches, with bent or branch couplings. Fig. 2 shows the cup on the lower side of the trap. When put in place, however, the trap can be used either side up by simply loosening the couplings and reversing the body. This trap, like the one previously noted, is made of cast brass, rough or finished by polishing or plating, as may be desired, while the cup may be either of brass, lead or glass. So far as indestructibility and attractiveness of appearance are concerned, the same remark applies to all the combination Bower traps. In Fig. 3 is shown a sectional view of a double combination trap, designed for common overflow wash-basins. The ends are threaded for couplings, or finished plain for lead connections, as with the single trap. Like it, also, the double combination trap is adapted to either the Bower basin plug or the ordinary plug.

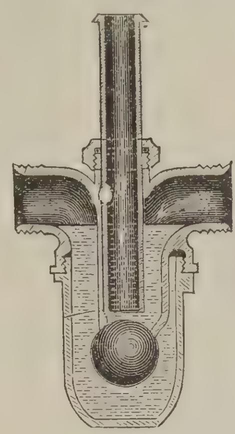


Fig. 3.—Double Combination Trap.

The vertical pipe is the inlet, the one to the right the overflow from the basin, and the one to the left the outlet. It will thus be seen that the overflow passages are below the water line, thus preventing a free circulation of air from one connection to the other; and a further point to which attention is directed is that the valve effectually seals both inlet and overflow from back pressure and absorbed gases. This trap is in Fig. 5 shown in position under the basin. An adjustable overflow, with the connections for combination traps kept in stock by Messrs. Bower & Co., permits the work under washstands to be completed with little labor. The fittings, like the traps, are of brass, either rough, polished or plated. The Bower basin plug, with removable strainer, is shown in Fig. 6, Fig. 7 illustrating the strainer full size. The strainer is so made that it readily drops into place and can easily be removed with a hook to clean it from hair and lint. The inlet-pipes of the double and single combination traps are

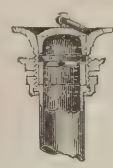
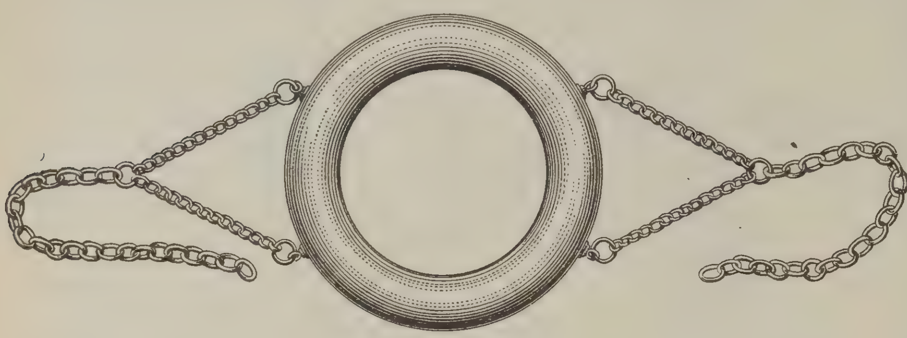


Fig. 4.—Sectional View of Plug.

of the size of the opening in the plug when the strainer is removed, so that the pipe from basin to trap is one continuous size, and when the strainer is removed this pipe can be cleaned perfectly, without disturbing the trap, by means of a combined hook and cleaner, which is simply a rubber disk held in position above a hook and at the end of a rod. The large engraving, Fig. 5, represents the Bower double combination trap, with the Bower patent adjustable overflow and inlet connections, with long vertical branch to floor; back vent, floor and wall plates. The cup in this instance, it will be noticed, is made of glass. We have not illustrated all of the new articles made by Messrs. Bower & Co., and have only mentioned incidentally the extensive variety of fittings used in combination with their traps.

Fig. 5.—Basin Fitted with Bower Double Combination Trap.

The Jacobus sanitary bath-seat, illustrated in Figs. 6 and 7, has been recently put on the market by Wm. Jacobus, 4 Spruce street, Newark, N. J. The object of the device is to provide a suspended seat adapted to be used as a bath-seat, or as a substitute for a commode by "camping-out" parties, the seat being intended to be adjusted to any desired hight, whether used as a bath-seat or commode. In Fig. 6 a general view of the seat is presented, from which a definite idea may be gained of its appearance and construction. The seat, of annular shape, is semi-circular in cross-section and is made of nickel-plated sheet copper with a wooden core to strengthen it and prevent it becoming indented. At the sides chains are fastened in the way illustrated, hooks as shown in Fig. 2 being provided, by which the seat can be adjusted to any hight within the bath-tub. The seat is very light, and, as indicated in Fig. 7, floats on the surface of the water. The plated hooks on the side of the tub are so arranged that they will drop flush with the woodwork when not in use, and are insulated when used for electric baths. The seat can be instantly adjusted and combines perfect support with complete freedom of motion. In referring to the merits of this device the manufacturer directs attention to the advantages of this seat for the many forms of disease requiring special treatment, such as rupture, hemorrhoids, hip disease, &c., for by it the body is supported away from the metallic lining of the bath-tub. As the seats are of nickeled copper there is no danger of their carrying disease germs, which make them especially desirable for use in hotels, public baths, hospitals, &c. In addition to the advantages above referred to the manufacturer alludes to their neatness, convenience and the comfort that may be derived from them by all persons.



Some New Plumbing Goods.—Fig. 6.—General View of Jacobus' Sanitary Bath Seat.

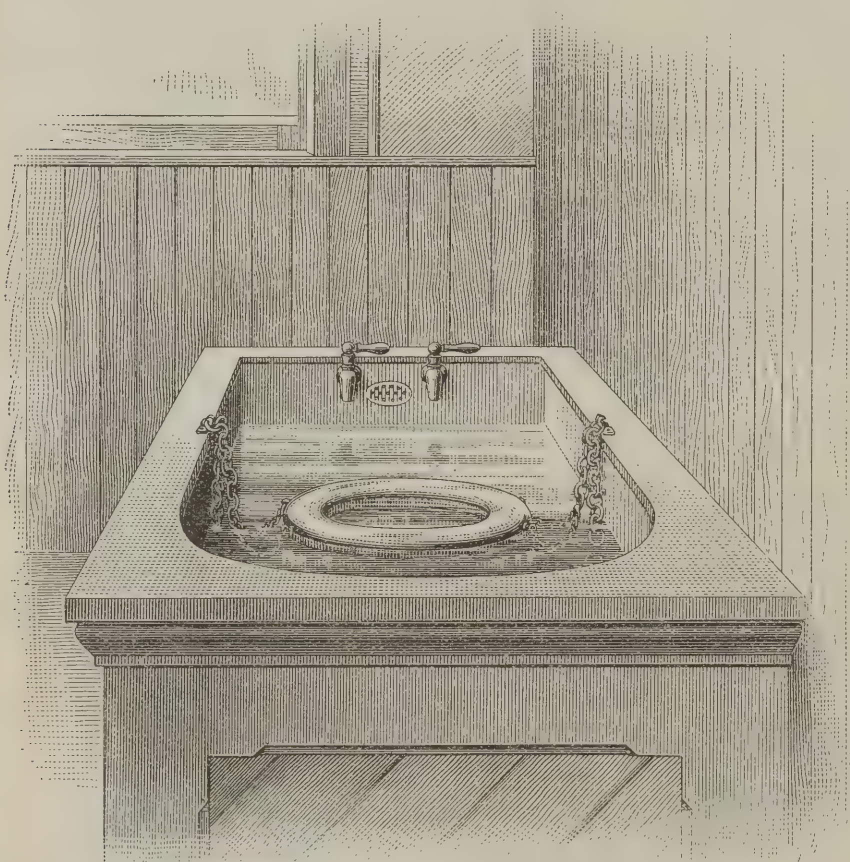


Fig. 7.—Showing Seat in Bath Tub.

We illustrate in Fig. 8 the Havanagh floor connection, which is offered to the trade by James Hanse & Co., 43 Beekman street, New York. In the cut, sectional views of the two parts of the device are illustrated, showing their position and the manner of attaching them to the water-closets. The connection consists of two brass flanges. The upper flange is conical and made to receive a rubber packing as shown in Fig. 8, which, when the flanges are brought together by means of bolts, presses the packing inward against the porcelain and downward on the lead flange; thus, it is said, insuring a perfect joint and one proof against the shrinkage of woodwork. The manufacturers allude to the advantage of this connection over the ordinary method of connecting closets and soil-pipes.

A disinfecting fluid called chloro-naphtholeum, said to possess thorough effectiveness as an antiseptic and disinfectant, besides being cheap and having an agreeable smell, is being put upon the market by Robert S. West, corner of Elm and Winslow streets, Cleveland, Ohio. From a circular before us we learn that this preparation is already largely used in England, and a number of very strong testimonials from those who have used the material abroad are presented. Its power as a germ destroyer is said to exceed that of carbolic acid and other similar antiseptics that are soluble in water. It does not dissolve in water, but mixes with it, forming an emulsion like milk. In this the chloronaptholeum exists in the form of minute globules, each of which, it is claimed, is undiluted and retains the full power of the compound. In contact with the atmosphere it is said to slowly decompose, yielding ozone. It is claimed to be perfectly harmless and can be used freely. For the purpose of making use of this material a number of automatic disinfectors have been invented, for which patents are at the present time pending. Fig. 9 represents the disinfector for urinal bowls. It consists of a tube hanging so that the fluid drips to the center and into the drain and thus runs into the sewer. The construction of the tube is very simple. A wick at the lower part is used to draw out the fluid from the tube and is so placed that it allows only enough at a time to thoroughly disinfect the place for which it is intended. Another form of disinfector is designed for kitchen sinks. It is so constructed that the drippings of the fluid can be stopped at any time, so that when any necessary work is being done at the sink the disinfector can be put aside. A third form of disinfector is for sick rooms and for other places where it is necessary to destroy any poisonous germs that may be in the air, or to sweeten the atmosphere. We understand that there are some other forms of disinfectors prepared for using the material as above described.

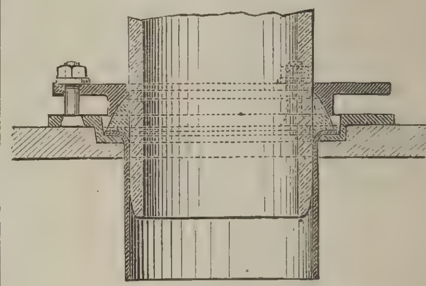


Fig. 8.—Sectional View of The Havanagh Floor Connection.

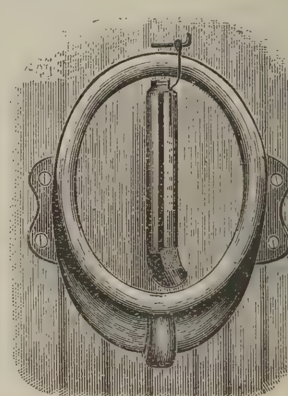
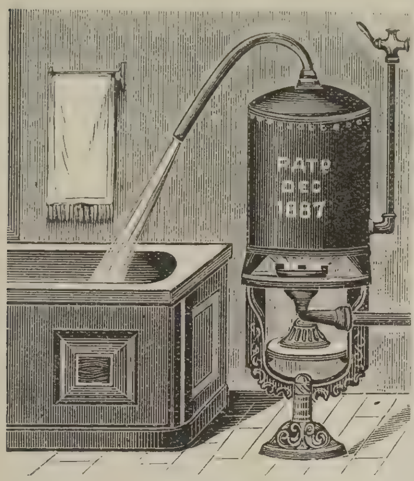


Fig. 9.—Automatic Disinfectors Applied to a Urinal.

McCahan & Co., 8 North Central avenue, Baltimore, Md., are offering to the trade a device for heating baths and which is also applicable, in another form, to supplying hot water by means of an ordinary range boiler. Fig. 1 illustrates



Some New Plumbing Goods.—Fig. 10.—The Surprise Bath Heater.

the Surprise gas or gasoline bath heater as put up and in use. The capacity of this heater is 10 gallons, and it is described as a complete heater and bath boiler. As shown in the cut it is intended to be put alongside of the bathtub and connected to the cold-water spigot. The hot water as it issues from the top of the heater is drawn into the tub through the gooseneck. Another way to arrange the device is to connect it permanently by pipes and have a hot-water spigot placed beside the cold one. It is adapted to either a gas stove or an aerated gasoline burner, as may be desired. A special point to which the

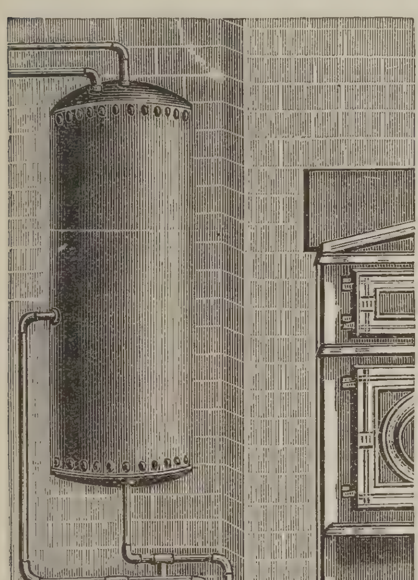


Fig. 11.—The Surprise Boiler Heater.

manufacturers refer is that it will fit over the hole of any stove, either coal or gas, or gasoline range. As it combines the elements of a water-back and boiler, it may be connected to the house pipes, made to deliver hot water where desired, and requires no more attention than the ordinary bath boiler. The boiler part is made of mild steel and is tested to 150 pounds pressure. The makers inform us that they have already sold a number of these articles and that they are giving excellent satisfaction wherever used. As to the cost of running the device, it is stated that it consumes but 6 feet of gas per hour, which, at $1.50 per thousand, would be less than 1 cent per hour for fuel. The second application of the device, as shown in Fig. 2, is to an ordinary range boiler. The general features of it are the same as in the previous case, though the water-heating part is of a different shape. The illustration shows the method of connecting pipes, as well as the position of the heater. The manufacturers state that it can be easily put up, and refer to the advantages which it possesses in not taking up any floor room or needing any stop-cocks.

The "Monitor" attachment for bathtubs, which combines an overflow stopper, strainer and trap, is being put on the market by the L. Wolff Mfg. Company, 93 West Lake street, Chicago, Ill. The accompanying illustration shows the general features of the device. The attachment is an overflow tube in connection with a heavy cast brass trap, arranged as the cut indicates. The chief advantages claimed for this device are that all the parts are in sight and accessible, and that the trap may be readily gotten at. When desired the overflow can be lifted out, so that it, as well as the trap itself, can be easily cleaned. Braces at the top and at the bottom are provided which hold it firmly in place. The outlet being 2 inches in diameter and free, carries off the water, it is claimed, in half the time usually required. Another advantage to which the manufacturers call attention is the fact that it dispenses with the chain and plug ordinarily employed, and thus does away with all danger of chipping the porcelain from the tub. Attention is also called to the advantage it possesses over ordinary cased-in overflow and concealed trap. The bath-cock is made especially for the tub, and has a shower attachment, but a compression bath-cock will be supplied if desired. The tub illustrated in the engraving is made of iron, porcelain lined, with a recess at the end.

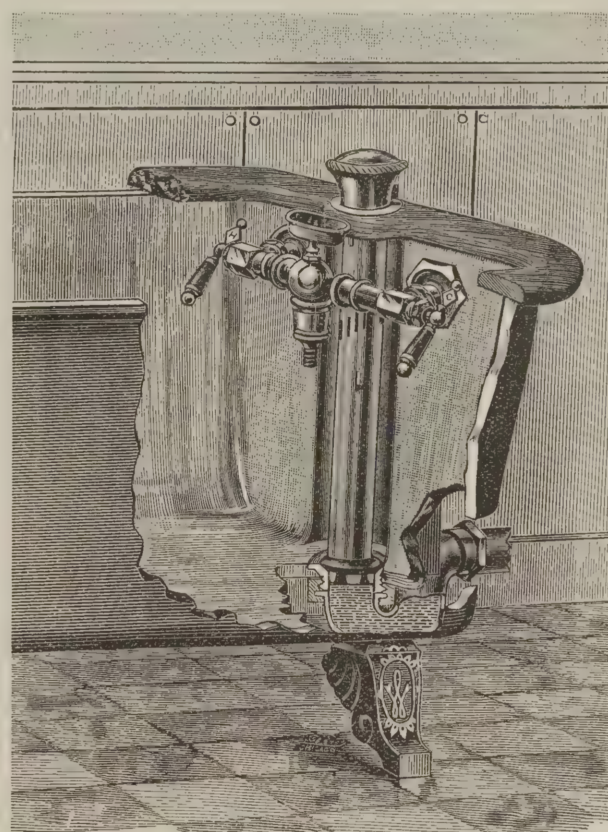


Fig. 12.—The Monitor Bath Tub Attachment.

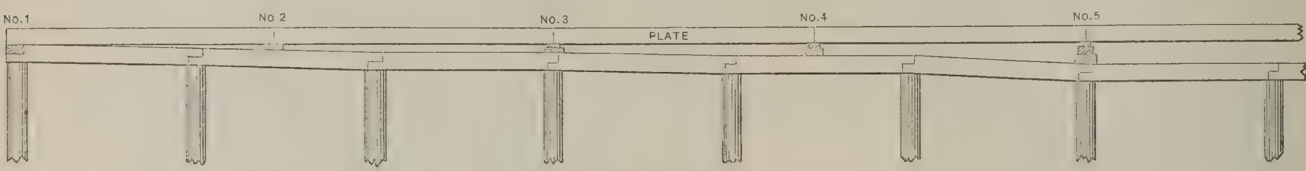
Steps in Greek Temples.—Every one who has examined models representing the architecture of ancient Greece must have been impressed with the symmetry of the buildings, and perhaps it has dawned upon his mind that the Greeks in their temples at least paid more attention to symmetry than to convenience. This will account for the fact that their steps were of the most uncomfortable hight. E. Dodwell writing upon this point says: The steps of the Propylæa are more than a foot, and those of the Parthenon nearly 2 feet, in hight, and were accordingly better adapted to the size of the building than to the human frame. The steps of the great temple at Pæstum are still higher, being 2 feet 2½ inches! Winckelmann supposes that they served as seats for the populace at festivals. Low and easy steps seem not to have formed a part of Grecian luxury, and it is probable that the rich and magnificent stairs of the royal palace of Caserta, near Naples, and of the Braschi and Barberini palaces at Rome, and the more convenient ones of the Vatican, were never equalled by the Greeks in their edifices.

Although the building business seems to be dull in some parts of the country the present season, there are notable exceptions. Every now and then we receive a copy of some local paper which indicates that the building industry is booming in the particular locality named. A case in point is Ironton, Ohio, which at present it is estimated has $225,000 in the process of being invested in buildings. This is a large amount considering the size of the place and the industries represented. We learn that brick masons, carpenters, plasterers and painters are all occupied and have called to their assistance many men of other trades who are not employed

CORRESPONDENCE.

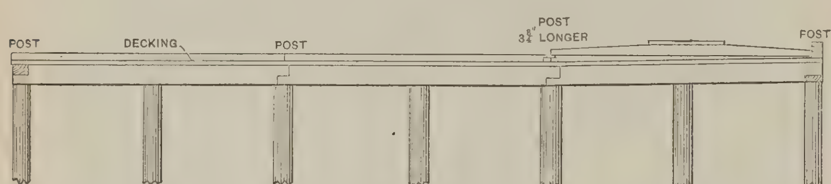
Amateur Engineering.

From C. E. B., *Norfolk, Va.*—After looking over some of the back numbers of the paper, it has occurred to me to send along a sketch representing some work in the engineering line that I helped to do some time since. Surveying seems to have engaged the attention of some of your subscribers in the past, and perhaps what I have to submit will not be without interest for some of your readers. While as a good union man I do not think it is



Amateurs' Work in Leveling.—Sketch Submitted by C. E. B., Showing Side Elevation of Pier.

exactly the thing for those who have one trade to tinker with what belongs with some other trade, yet circumstances alter cases. We had no engineer and no means of securing the services of such a man; accordingly I thought there was no harm in doing what we did, and I still further think that there is no harm in telling how we did it. It is so simple that, perhaps, it will cause some of your readers to remark that any chuckle-head could do that well. However, I will pass by the old men in the trade and simply explain, for the benefit of the younger readers of the paper, how such a thing may be done, and perhaps it will be of benefit to some of the boys. The sketches which I inclose represent a side and end view of a pier upon which a shed was to be built. If you will look at the sketch carefully



End Elevation of Pier.

you will notice that it is very much out of level, so far as the tops of the piles are concerned. The facts of the case were that the foundation was highest at one corner. The way we got at it was to take the centers of all the posts, cut the plate for one side and string them out as in the sketch. Starting from the high corner we leveled up this plate, using simply a common level. Having this done we leveled across the end, as shown in the other sketch, and then down the opposite side and across to the plate where we commenced. We succeeded in carrying this around with only ¼ inch difference. This, it was estimated, was quite good enough in a building 40 x 150 feet in size. Then, starting with a 16-foot rod, we added the distance from the deck to plate to the first post. We cut or numbered it and so continued on around. For the center rows we worked with straight-edge and level. We took the level from the bottom of plate to the center mark for post. Then, if it was 6 inches from deck to plate and 9 inches from deck to straight-edge, the particular post would be as much longer as necessary. By working in this way we secured very satisfactory results. There may be better and more scientific ways in which work of this kind may be accomplished, but, for the benefit of the young readers of the paper, I would say that this was one way in which it was done and done satisfactorily. We may not have set out by the shortest route, but we got there all the same.

Scales on Pocket Rules.

From H., *Chariton, Iowa.*—Your answer to "H. A. M.'s" inquiry in the May issue of *Carpentry and Building* for an explanation of the graduated spaces on his 2-foot rule is correct so far as the octagon scale is concerned. You have overlooked, however, the fact that it can also be used as a brace rule, the line E being a table of equal sides of a square, and M a table of diagonals or braces.

Determining the Thickness of Brick Walls.

From G. W. S., *Montclair, N. J.*—In a recent issue of *Carpentry and Building* one of your correspondents asks for a rule for determining the thickness of brick walls for stores and buildings in general. The rule that I have always adopted is that the average thickness of a wall for each story should be one-twelfth or one-fourteenth of its hight. When it is the intention to use stone walls instead of brick—for example, broken range work or quarry faced range—I add from 4 to 8 inches to the thickness given for brick walls. For instance, for a wall 50 feet high and 100 feet in length this rule would work as follows: The basement should be 20 inches in thickness, the first story 16 inches, the second story 16 inches and the third story 12 inches. This is where the wall is built of brick. The footing course should be twice the thickness of the basement walls. All division walls should be at least 12 inches, for when the walls are only 8 inches, the beams of the floors on each side cut through them.

The Architects of the Future.

From A. R., *Chicago, Ill.*—The writer was taking an early morning walk a short time since along the shore of Lake Michigan, and noticed at his feet the curious shaped edifices that the children had erected the day before out of pebbles and sand, for that was all they had to build with. A description of these "works" would be difficult, to say the least, but they had about them what every building should have, and that is ideal. Those that are acquainted with the buildings situated on and near the Lake Shore drive (Lincoln Park) must have noticed that there are many works of art in stone, brick, copper, and other materials located thereabouts. This fact set us wondering if, as the children walked up and down the various streets leading to the lake shore, the impressions their minds received by looking at the many beautiful buildings were not, to a certain extent, reflected in the forms that they had erected of sand and pebbles, some of which showed considerable study. It is true that during the night a rain storm had washed away some of the fine points of the studies, but, for all of that, there remained enough to show an observing person that thought had ruled their formation. But, perhaps the reader asks, what about the title of the article, what about "the architects of the future." The writer's impression is that they are here, only waiting opportunity and time to take their places, and when their turn does come, is it not fair to presume that their life's work will be better for their childish playhouses? for, after all, the child is father of the man.

Oblique Bevels.

From Fred Lascy, *San Francisco, Cal.*—I submit another communication on oblique bevels and their applications:

Given the run K V, the rise K A and the slope A V of a stick of rectangular timber which at its lowered end V butts obliquely against a vertical plane whose ground line is in the direction V C. The corner K V C = u may be any angle whatever. The triangle V K A may be of any size, and is supposed to stand perpendicular to the plane of the paper. Required for the lower end of the stick the miter cut across the top face; also the down cut, so that this end of the stick may fit against the vertical plane whose ground line is V C. First, from the point K, and at right angles to the run, draw K C to intersect the ground line of the vertical plane. From the point A, and at right angles to the slope, draw A B = K C; also draw B B; then A V B is the miter cut across the top face. Demonstration: The triangle V K A being perpendicular to the plane of the paper, let the triangle V A B revolve on V A as on a hinge, until the line A B comes into the horizontal position over K C; then A V B is the required sloping tri-

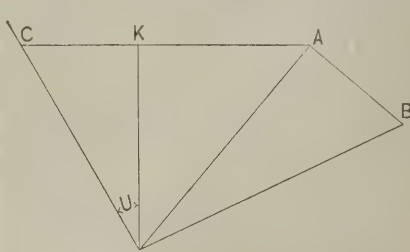


Diagram Accompanying Communication of F. Lascy.

angle of which K V C is the plan. By the steel square on a line. Place K C on the blade and the slope V A on the tongue. Mark along the tongue for the top face miter. The end down cut may be marked by a bevel set to the angle K A V. The stock of the bevel is applied along the bottom face of the stick with the blade of the bevel pointing upward along the side face. The most common applications are the rafters which butt obliquely against valleys,

hips and ridges. If the line V A represents a raking planceer, which at the lower end of a gable miters around a square corner and against a horizontal planceer that slopes in accord with V A, then the angle *u* is always 45°, and C K and A B will each equal the run V K. The miter for the end of the horizontal planceer will be the angle A B V. The horizontal planceer is supposed to have its inside edge beveled to fit against a vertical plane; a square mark down the beveled edge is the down cut through the thickness of the mitered end of the wider horizontal planceer. V A and V K show the relation between the width of the two planceers. If V A is a raking molding, mitering at point V around a square corner and against a horizontal molding. The lower end of the raking molding should be cut in a miter box, with that part of the molding which is nailed against the gable placed against the side of the box. The foregoing are the proper cuts for the miter box. The line K C, &c., may be drawn anywhere along the line K V.

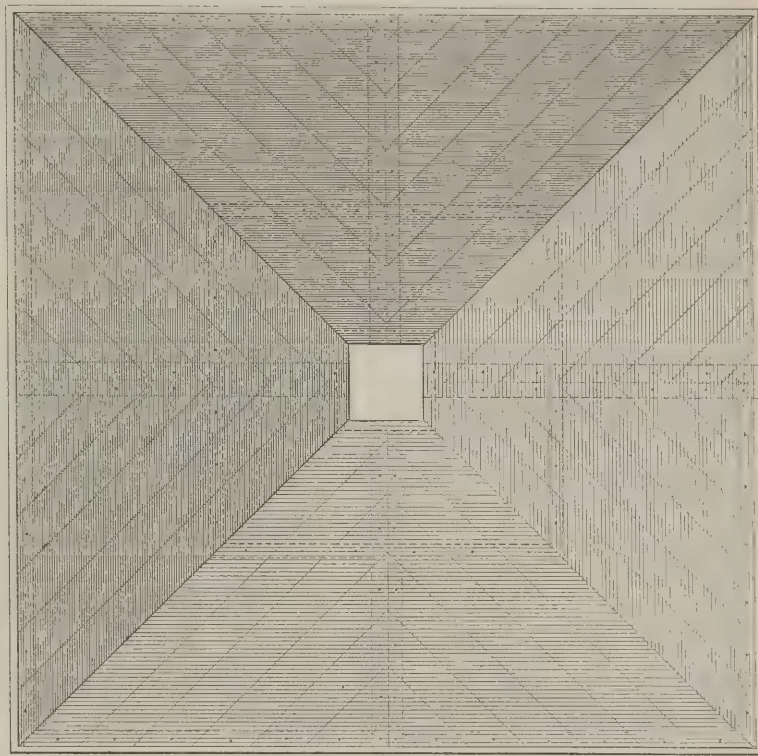
Machine for Cutting Standing-Seam Roofing.

From C. K. M., *Rock Island, Ill.*—Your correspondent, "H. F. R.," of Denver, Col., asks for a machine to cut off standing-seam tin roofing in a way to leave a straight edge. If he will use the Berridge double cutter, I think he will find that it is satisfactory for the purpose. By the use of this tool tin roofs can be removed in the way that he describes with very little labor.

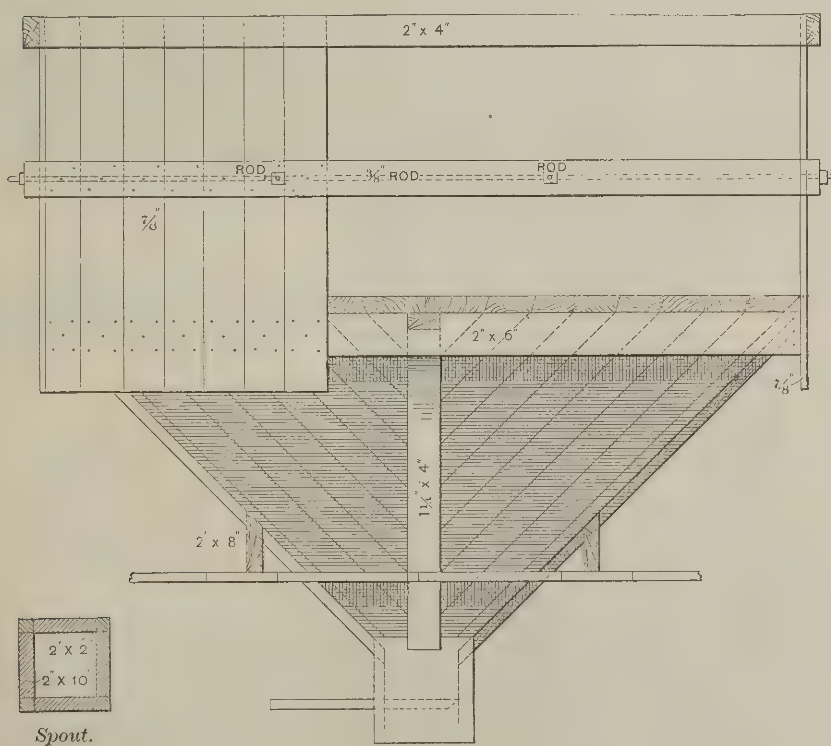
Construction of a Hopper.

From R. J. M., *Le Sueur, Minn.*—I inclose sketches illustrating the construction of a hopper adapted to hold 200 bushels. I send it in response to the inquiry proposed by "C. M." a few months since. A description is scarcely necessary, for the construction of the hopper is clearly shown by my sketches.

Note.—We have reproduced our correspondent's sketches as carefully as possible, and submit his letter and drawings together for the benefit of those who are interested in the subject.



Plan View of R. J. M.'s Hopper.



Spout.

Side Elevation of Hopper Described by R. J. M.

Management of Siding.

From B. S. H., *Evansville, Wis.*—I have a point in building practice that may interest some of your readers. Give a siding a priming coat of paint before the material is put in place. Paint the edges of five or six pieces at a time, then spread out on horses the proper hight for a painter to work easily. The siding is then to be at once stuck up with lath the priming side down; of course, the siding to be treated in this way advantageously must be seasoned and dried. The reason for this method is plain. Oftentimes a heavy shower of rain will wet the side of a building so as to roll or draw on the nail heads, and never come back into place. The gain in time is much more than compensated for by the small cost of paint. I have employed this method for two or three years past, and so far as I know, am the first to use it. The wonder is, in view of the advantages, that I did not think of it before.

Material Under Tin Roof.

From F. H. D., *Black River, N. Y.*—I would like to inquire through *Carpentry and Building* what is the best and cheapest material to put under a tin roof where there is more or less steam rising in the building over which the roof is placed.

Answer.—We would recommend, under the circumstances, a good quality of building paper, taking care, however, that the paper is of such a character as not to damage the tin in itself. We do not like saturated felt in which coal tar is employed, as well as some other grades of building paper. Those of our readers who have had experience in this direction will perhaps write upon this point.

Preventing Rusty Water in Tank.

From F. L., *Milford, N. Y.*—I have an iron tank which feeds a boiler to a range. The tank is located in the second story and the water runs into it from the roof, which is of slate. The tank is of wrought iron and the trouble is that the water is so rusty as to be unfit for use. Is there anything I can use to prevent it from rusting and not to make the water unfit for use? I would like some one to express his opinion through the columns of *Carpentry and Building.*

Note.—Our correspondent has asked for the opinions of other readers, so perhaps he does not desire us to give our ideas on the subject. Nevertheless we will say a few words, in the hope that we may be able to suggest a remedy for his difficulty. We presume the water is only used for washing and similar purposes and would not be injured if it was given any harmless odor. If this is so, we would advise our correspondent to clean his tank thoroughly and then give it two or more coats of asphaltum varnish. We know of cases

where this varnish has been used with the very best results. Although it will probably make the water taste, it will not contaminate it or render it unfit for ordinary purposes. If properly applied, the varnish will prevent all further rusting and we should think would solve the difficulty experienced by our correspondent. If any of our readers have a better remedy to suggest, or any remedy at all, we would be glad to hear from them.

Splicing Studding.

From B. S. H., *Evansville, Wis.*—Your correspondent "S. B. B.," of Appleton, Wis., in the June issue of *Carpentry and Building* inquires where and how to splice studding in a building, the walls of which are to be 38 feet high to the plate. In reply, I would state that I would not splice them at all, but I would use studding for each story equal in length to the hight of the ceiling required. I would spike on to the first tier two thicknesses of 2 x 4 and true the building up as for plates; put on the joists and toenail to plates; then set the next story studding, toenailing the same to the sill and spike the joists to these, and so continue for each story. This plan has been my practice for a number of years and I find it to be far better than the old method.

Transmitting Power.

From C. F. S., *Trenton, Tenn.*—I write to *Carpentry and Building* for information on the following points: We are about to build a cotton gin 250 feet from our cotton factory and wish to convey the power to the former from the mill. We have two plans under discussion—one to convey the power direct from the engine room to the gin by means of a wire rope; the other plan is to buy a small engine, say 10 horse-power, place it in the gin house and connect it with the boilers of the cotton factory by pipes. Which of the plans do you prefer, or do you know of one preferable to either? Our engine is of 125 horse-power, 85 horse-power of which is required to work the mill, and the boilers must also supply heat during winter.

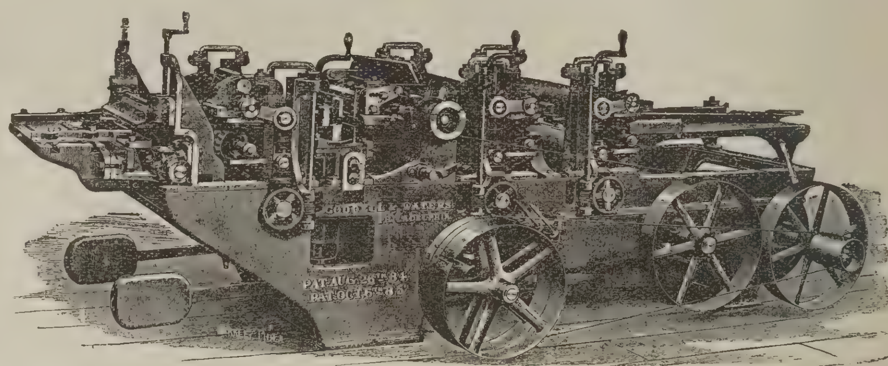
Answer.—From the latter part of our correspondent's letter we judge that he has a surplus of power in his cotton mill, as the engine is rated at 40 horse-power more than is required by the mill. Under these conditions, therefore, we do not hesitate in recommending our correspondent to use some method of rope transmission in preference to setting up a separate engine and carrying steam to it from the main boiler room; for beyond the cost of a new engine, pipe, fittings, &c., there would be loss due to the condensation of steam. Rope transmission, on the other hand, is used very extensively in cases similar to the one cited by our correspondent, and, so far as we know it has, in all instances, given satisfactory results. Our correspondent mentions wire rope; but we suggest that unless he has some especial reason for using wire, that he substitute hemp instead, as the latter is more generally employed for the purpose. The stiffness of the wire rope consumes considerable power in bending over the pulley, all of which is saved in the hemp rope. Furthermore, the original cost is much less in the case of hemp, and we believe, where properly put up, the rope will last for years.

Gummey, Spering & Co., Philadelphia, referring to the Patten tin shingle, which they manufacture, mention the fact that these goods are gradually taken the place of terra-cotta tile, which have so long been largely used in Central and South America and other parts of the world. A very considerable export trade is being built up in them.

Novelties.

Double Surfacer and Matcher.

The new double surfacer and matcher illustrated in Fig. 1 of the engravings is one of the most recent productions of Goodell & Waters, Philadelphia. From the makers' description we learn that the machine is adapted to double surface 24 inches wide, and of different thicknesses up to 6 inches. It will also tongue and groove material 20 inches wide. In the designing of this machine the makers assert that they have retained all the features of the Woodworth planer that their experience has demonstrated to be valuable, and, further, have added several new and noteworthy improvements to which they direct attention. The working parts and adjustments are all within plain view of the operator and are calculated to facilitate quick changes for the different grades of work. By a peculiar arrangement of the gearing the rolls are maintained parallel under all circumstances. The gears are covered and are well protected from dust and shavings. The upper and lower cutter heads are easily accessible, a feature which operators generally will appreciate. The bars are arranged to allow molding and sliding cutters to be used. The makers inform us, further, that particular attention has been devoted to the arrangement of the side spindles. Each head is adjusted independently, and when properly set it is held firmly in position. The upper and lower spindle boxes are new in design and are provided to carry an ample supply of oil. The lower ends of the spindles run in oil boxes and rest on a step of hard bronze. It is essential to good work that the side heads of such a machine as this should be perfectly true. Referring to this point, the makers assert that by their method they have attained the highest possible results.



Novelties.—Fig. 1.—Double Surfacer and Matcher, Built by Goodell & Waters, Philadelphia.

New Pedestal Tenoner.

Messrs. C. B. Rogers & Co., of Norwich, Conn., and with warerooms at 109 Liberty street, New York, are directing attention to a new pedestal tenoner shown in Fig. 2 of the accompanying engravings. They assert that in the design and construction of this machine they have embodied all of the best features of the style of tenoner formerly produced by them, and in addition have introduced new and thoroughly practical ideas. They describe the device in the following terms: As will be seen in

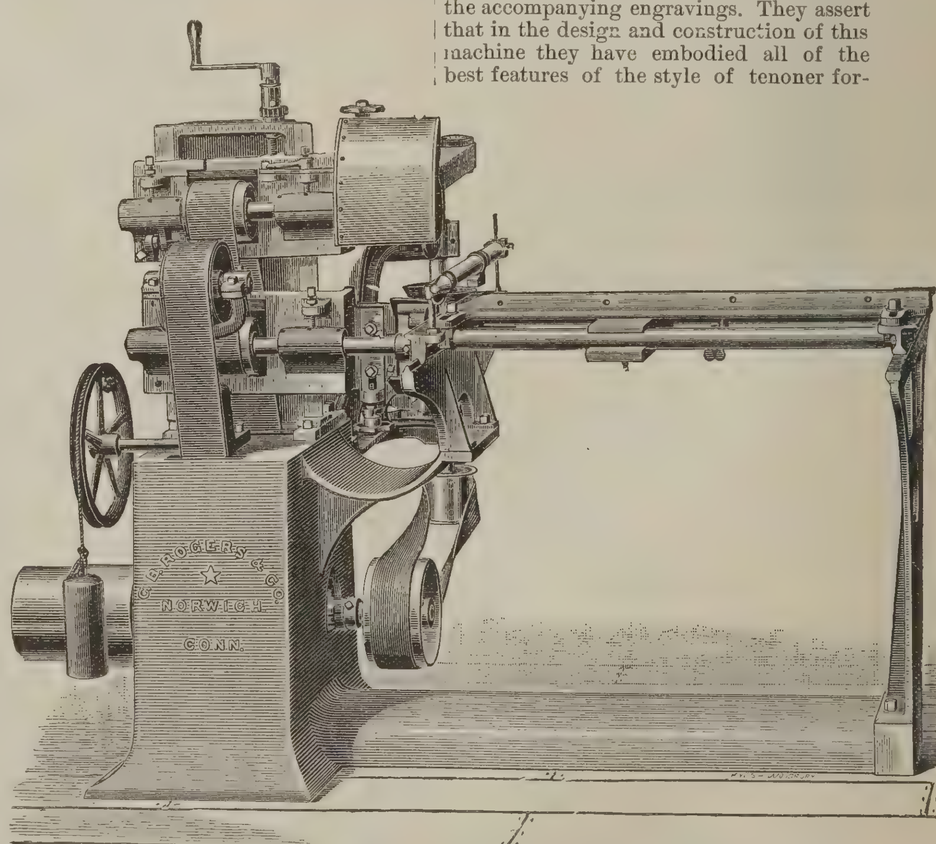
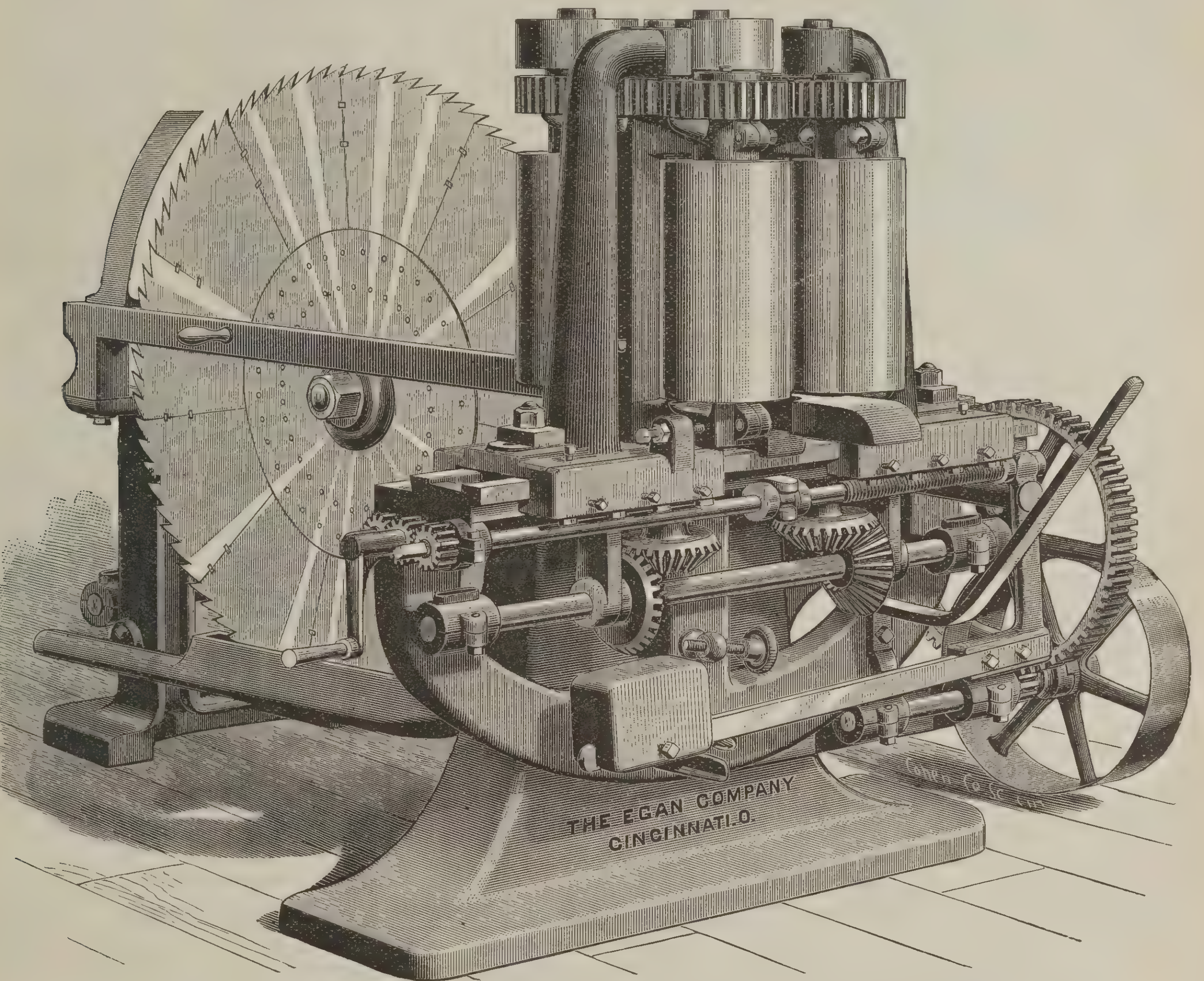


Fig. 2.—Pedestal Tenoner, Brought out by C. B. Rogers & Co., Norwich, Conn.

the cut, all of the working parts of the machine are supported on a heavy iron frame, cast in pedestal form, and to which at either side are attached the boxes for the main countershaft. Attached to this column, and cast with it, is an arm with V track that supports one end of the carriage or table, the other end being supported by a smooth-way attached to an extension of the foot or base of the machine. With this arrangement of the way the operator is enabled to follow the carriage right up until the work has passed the cope cutters. The cutters' heads, with straight cutters set for a draw cut, are attached to heavy steel spindles, running in self-oiling connected boxes, to which are also hung the cope-heads, the whole being gibbed to the upright. By an ingenious arrangement the heads are raised and lowered independent of each other, or may be adjusted together to any desired hight above the carriage without altering their relative positions. The copes being hung on the same yoke with the tenoning heads, when once set, require no further attention; they are, however, provided with both horizontal and lateral independent adjustment. The pulleys on the cutter-head spindles, as well as the main driving pulley on the counter, are placed between the bearings, and all the other pulleys placed close to the bearings, adding much to the stability and capacity of the machine. The arrangement of this machine is such that every necessary adjustment may be made from the operator's position in front of the carriage.

Segment Re-sawing Machine.

We illustrate in Fig. 3 a new circular re-saw with segment blades, for use where a great deal of work is wanted with the least waste in kerf. The saw is manufactured by the Egan Company, Nos. 221 to 241 West Front street, Cincinnati, and is described by the makers as follows: It can be used to great advantage for all kinds of splitting in car works, box factories, planings mills, furniture and piano factories who desire to hold their lumber well up to size. The segment blade takes out but little kerf, is easily kept in order, and both the quantity and quality of work are all that can be desired. The frame is very heavy and substantial, and is planed perfectly true to receive the swinging feed roll frame and mandrel boxes. The feed consists of four heavily geared feeding rolls, with front top rolls for straightening wide boards. The frame which carries the feeding rolls is pivoted on the main frame in such a manner that all four rolls can be adjusted to any angle at once by loosening one hand-lock nut; the setting and angling is done by an adjusting screw to facilitate accuracy in adjusting the rolls to any desired angle. The rolls are self-centering—that is, a board 1 inch thick may be followed by one 1¼ inches thick, and both may be split in the center, or either pair of rolls on either side of the saw may be made rigid by loosening one hand nut, so that slabs of any desired thickness may be cut from a plank. The rolls come within ⅛ inch of the bed plate, allowing strips ¼ inch thick to be split if necessary, which is an advantage not possessed by many other machines. The mandrel is of the best crucible steel of large diameter, running in self-oiling boxes; the pulley on mandrel is placed between bearings, which are adjustable, and slide on planed ways to and from the feed rolls to accommodate any size saw, and to bring the teeth of the saw close up to the feed rolls.



Novelties.—Fig. 3.—New Segment Re-sawing Machine, Built by the Egan Company, Cincinnati.

Solid Link Chain.

A novelty in chains adapted for various uses is being introduced by the Solid Link Chain Mfg. Company, No. 51 John street, New York. One form of the chain is shown in Fig. 4, and is approximately full size. It is that form which is adapted to be used for sash weights, with sash of medium to large size. Fig. 5 of the engravings show how it is to be applied. The chain is also adapted for many other uses, among which may be mentioned belting and chains for ornamental purposes. When used for sash weights, it has the advantage of being very nearly of the same section as the ordinary cord used for the purpose. In other words, it is very nearly round, and is not liable to be damaged by twisting. As indicated by the name, it is composed of solid links, and is the product of some very ingenious machinery. The chains of this general class have been commonly constructed so that the cross portion in each link between the bends which connect it with the loops of the link, is curved in a direction opposite to the direction in which the loops are presented. The consequence is that when strain is ap-

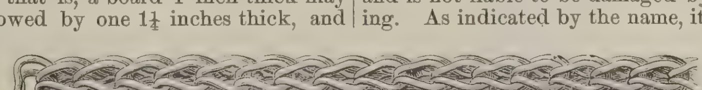
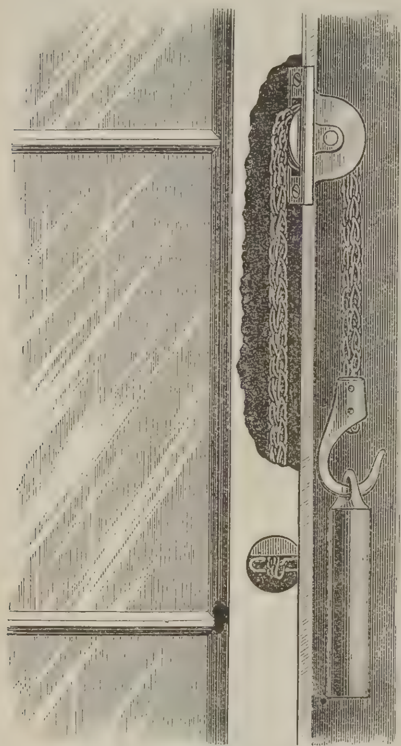


Fig. 4.—Solid Link Chain for Window Sash, &c.

plied to the chain the loops of each link have a tendency to draw and come together at the middle of the cross portion of the link which they embrace, thus impairing the flexibility of the chain. It is claimed that the chain here shown overcomes this difficulty entirely. The links, in order to



Novelties.—Fig. 5.—Sash and Weight Connected With Solid Link Chain.

simulate the appearance of wire, are stamped from flattened wire, thus securing round edges. The chain is manufactured in several different forms, as well as in the cable shape here illustrated.

Odd Jobs.

A name that is likely to become a household word, so to speak, with many car-

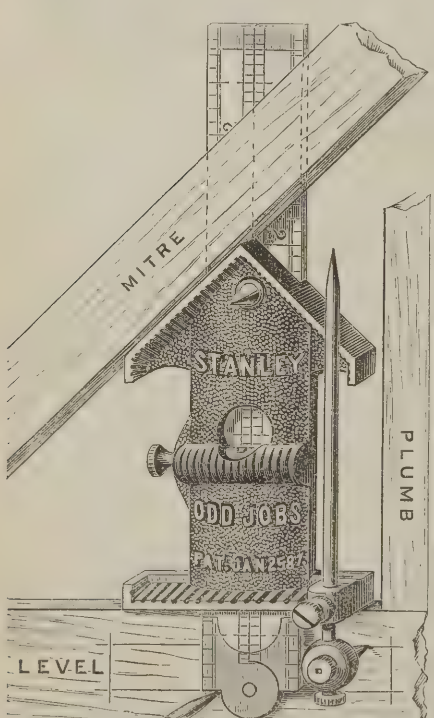


Fig. 6.—Odd Jobs. A New Tool Brought Out by the Stanley Rule and Level Company, New York.

penters and mechanics, has been applied to a new tool brought out by the Stanley Rule and Level Company, New Britain, Conn., with office at 29 Chambers street, New York. It is illustrated in Fig. 6 and is called Odd Jobs, in view of what it will do. It consists of a casting somewhat resembling a miniature house gable, with one round window in the end. The gable part, as we have familiarly described it, is a right angle, thus making the tool available for miter purposes and as a tri-square. The base is at right angles to the center line of the casting, thus adapting it for a level. The mercury-tube will be noticed in the cut. The tool is to be used for various purposes in combination with a rule, and, for that reason, the back of the casting is channeled out just the right width to receive an ordinary 2-foot rule when closed. The little set-screw shown at the left in the cut engages with the edge of the rule and holds it in place. With the rule inserted the range of work that may be accomplished will be readily perceived. No less than ten special uses are enumerated in the circular put forth by the company. These are as follows: A (1) tri-square, which is so evident that it does not need any explanation. The same remark also applies to (2) miter square. By combining with the rule and extending one end of the rule below the square head or base already referred to, a (3) T-square is secured. By keeping the rule in the same position and using a pencil or scratch awl in the angle of the rule as shown in the cut (4) a marking gauge is obtained. In the same manner a (5) mortise gauge is secured. By reversing the rule and allowing the opposite end to project beyond the base, a (6) depth gauge is formed. A (7) miter level and also a (8) spirit level are secured in a way already described. A plumb is derived by a line brought against the top and bottom projections as indicated at the right of the engraving. Referring to the cut, near what we have called the gable of the casting, will be noticed a sharp point. This is in line with the end of the groove or channel for the rule on the back. With the rule in the position already indicated, and using the point referred to as a center, a (9) compass or device for striking circles is obtained and that, too, with the means at hand for adjusting the radius to suit circumstances. Instead of using the rule as above described, the long scribe or point, shown at the right, may be employed, as shown in the cut. The end of the rod opposite the point is adapted to receive and hold a pencil, thus still further increasing the utility of the article in this regard. By using the right-angled edges at the top, which we have familiarly described as the gable of the casting, an (10) inside square for boxes and frames is obtained. We are not altogether certain that the above enumeration covers all the uses to which this tool can be put, but we give them as the enumeration which the company have made and leave our ingenious readers to discover still others. Using the tool as a beam compass, it has a capacity of from 1½ to 13 inches diameter. Smaller circles can be made by reversing the steel rod so as to bring the pencil near the center point. A circle of 25 inches diameter can be swung if the rule alone is used with a pencil in the angle at its head. This little article is being supplied nickel-plated, put up in neat boxes and is a most desirable addition to any carpenter's kit.

Newel Posts.

The Standard Wood Turning Company, Nos. 194 to 200 Greene street, Jersey City, N. J., have recently produced a number of new designs in newels, balusters and stairwork in general. The accompanying engravings, Fig. 7, represent two of their latest styles of built up newels and happily show the character of work turned out by this company. A detailed description is scarcely necessary. The catalogue put out by the company contains a very large assortment of designs, together with a price

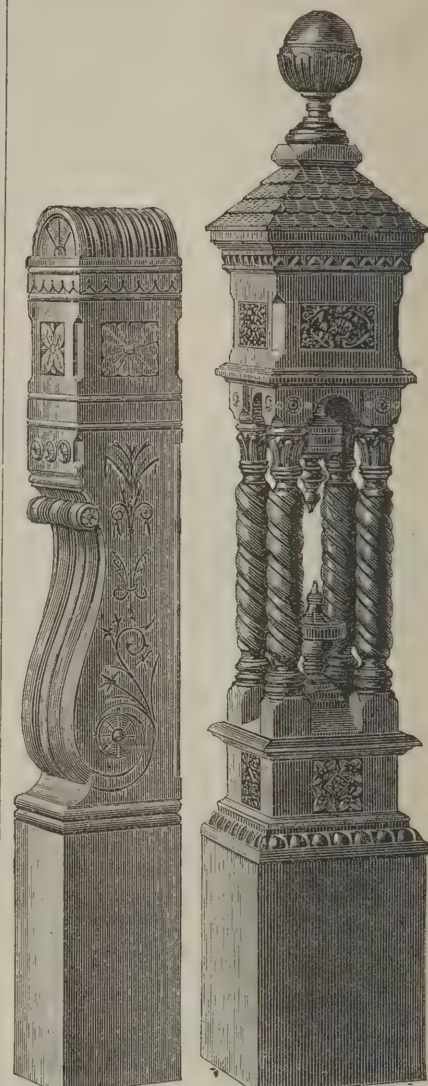


Fig. 7.—New Designs of Newels Supplied by the Standard Wood-Turning Co.

list, and is something that our readers in general will be interested in having.

Improved Plumb-Bobs.

The illustrations, Fig. 8, represent improved plumb-bobs, which are put on the market by Frasse & Co., 92 Park Row, New York. These plumb-bobs are

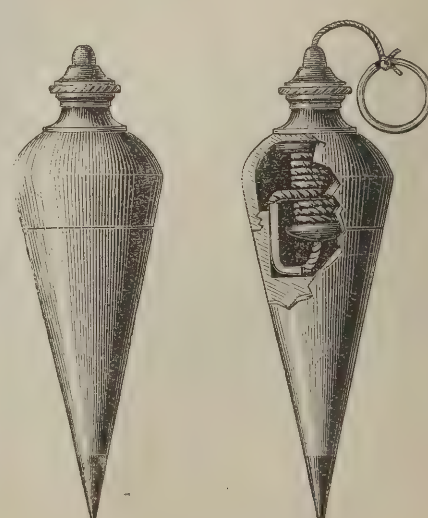


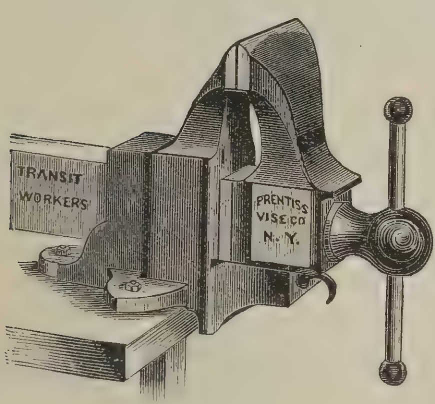
Fig. 8.—Improved Plumb-Bobs.

made in brass, with screw cap, as represented, and steel point turned true. The special advantage of these bobs over the

ordinary plain style is that the line is contained within them, wound around a concealed reel and held there by friction, so that as much of the line as is desired can be unreeled at any time and the remainder left on the spool. Frasse & Co. are also putting on the market brass plumb-bobs of different sizes and patterns assorted in sets of 14. These sets consist of one plain brass plumb-bob with screw cap and steel point turned true, each 2, 3, 4, 7, 9, 10, 12, 14 and 16 ounces, and two each 6 and 8 ounces, and one 14 ounces, improved brass plumb-bob described above. These plumb-bobs are mounted in a black-lined velvet tray and are described as beautiful in appearance. The steel points are described as screwed in and then turned off to a true center, thus securing their accuracy. They are made in two styles, the long slender and the round or peg-top shape, and in varying weights, comprising a complete line for either mechanics or surveyors.

New Rapid Transit Vises.

Figs. 9 and 10 represent a rapid transit parallel vise which is put on the market by the Prentiss Vise Company, 23 Dey street, New York. Fig. 9 gives a general view of the vise for woodwork-



Novelties.—Fig. 9.—Rapid Transit Wood-Workers' Vise.

ers' use, and Fig. 10 is a sectional view showing its mechanism: A is the rapid transit nut, which, in the illustration, is shown in place disengaged from the screw, the small cut showing the under half nut detached. B is an operating bar carrying two inclines or ledges, all of one piece, by which the nut is both opened and closed, and at the same time locking the vise. C is the groove in which the incline travels, thereby forcing one-half the nut up and the other down simultaneously on moving the bar to the front or rear ½ inch. D is a ratchet catch, or operating

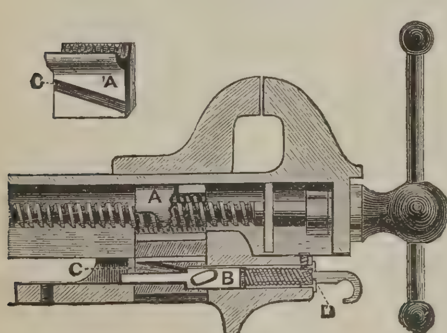


Fig. 10.—Rapid Transit Vise, Sectional View.

bar, which, when engaged, holds the nut open. With this construction by a simple movement it is explained that the vise may be opened or closed full length, and the nut will engage the screw at any point. The manufacturers allude to this device as extremely simple, strong and durable, emphasizing the fact that there are very few parts in it, there being only two pieces more in this vise than in the ordinary screw vise. The positive action and the firmness of the nut when locked are especially alluded to.

The Rose Sash Lock.

The Andrus Mfg. Company, Rochester, N. Y., among the goods described in their

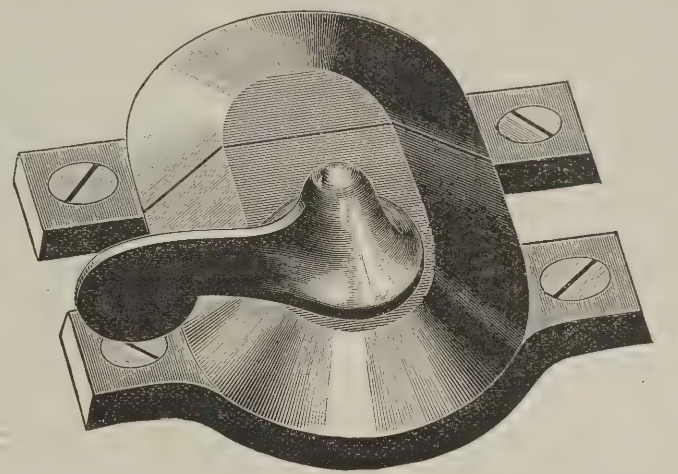


Fig. 11.—The Rose Sash Lock.

recent catalogue, illustrate the Rose Sash Lock, a cut of which is given in Fig. 11. In this sash lock there are no springs, it being operated by an eccentric by which the meeting rails are described as drawn together in such a way as to make them perfectly tight, preventing all rattling and keeping out dust and cold air. The lock is manufactured under the personal supervision of F. L. Rosentreter, the patentee. The locks are referred to as especially adapted to public buildings, as they are capable of forcing heavy sash to place and locking them securely. They are made in the following styles: Plain iron bronzed, iron bronzed polished, bronze knob, plain wire bronze metal polished and plain wire bronze metal dark.

Large Blue Prints.

Within the past year or two we had occasion to describe a method of making blue prints of extraordinary size, ranging up to 8 feet in length and 3½ feet in width. They were turned out on a revolving cylinder, contact being secured simply by drawing the tracing tight over the sensitive paper and the underlying felt by means of suitably arranged clamps and springs. No glass was needed, and the expense and risk, and something of the trouble, of the common method of operation was thus avoided. Special interest is therefore attached to a later and simpler apparatus and method devised by Prof. Robert H. Thurston and described by him in a paper presented this week to the American Society of Mechanical Engineers at the Nashville (Tenn.) meeting. The diagram, Fig. 12, explains the arrangement in question. The printing apparatus used consists of nothing but a single thin board of the length and breadth of the proposed print, with some margin for the stretching clamps. This board is covered with good felt of carefully selected quality, securely and smoothly fastened to the board by any convenient means. A line of tacks around the edges does as well, perhaps, as anything. The sensitive paper is then stretched over the felt, and the tracing drawn over that, and both are smoothly stretched by clamps or other convenient device. It is, of course, evident that it would not be practicable by this operation simply to obtain that complete contact and pressure throughout the surface in contact that is required for good work; but this desideratum is easily secured by the simplest expedient imaginable: The board is merely sprung to a flat arc in the direction either of its length or of its breadth, ordinarily in the longer line. This brings everything "taut," and the printing is done precisely as under glass, with the further decided advantage that no light is lost through the intervention of the glass, which, however excellent in quality, will inevitably absorb a very measurable amount.

The apparatus was designed by Professor Cleaves, of Cornell University. The upper, or printing board, is supported upon a lower and somewhat narrower and longer one, which in turn should be carried on trestles or other convenient arrangement. The printing board is stif-

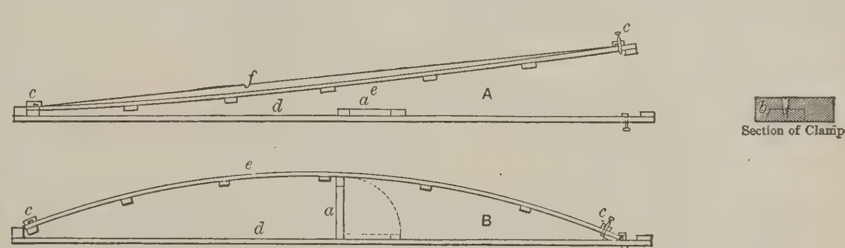
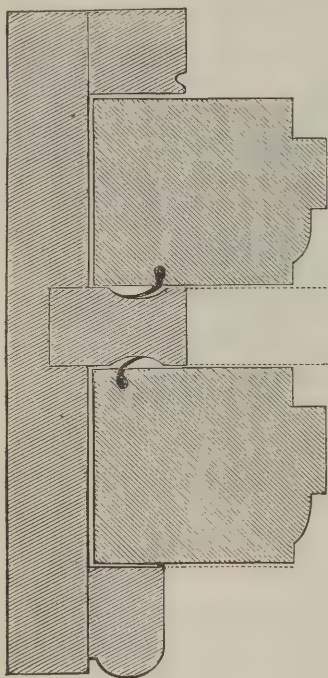


Fig. 12.—Apparatus for Making Large Blue Prints.

fened laterally by strips or battens, but is free to spring longitudinally to any desired extent. The supporting board is stiffened longitudinally. At each end of the latter is a batten, set transversely. Clamps *c c* are placed at either end of the printing board by means of which to secure the felt, paper and tracing. One or both of these clamps may be made adjustable for varying lengths of print. The engravings represent side elevations, and show the method of operation. The board is first raised at one end and thus slightly sprung. The felt and paper and the tracing which forms the negative are stretched smoothly between the clamps and well secured. The board is next laid

down on the supporting base, the two ends made fast, the one to the batten at the left, the other to another arranged at the proper distance from the right-hand extremity, the printing board springing into a curve, of which the bridge *a*, hinged at the middle as in A, and thrown up as seen in the sketch B, gives the versed sine. By springing to any desirable extent as in A, and then reversing the curve as in B,



Novelties. — Fig. 13. — Horizontal Section Through Window Frame, Showing Application of Everett's Weather Proofing.

any required degree of tension and stretch can be given the tracing, and thus any necessary amount of pressure and perfection of contact with the sensitive paper may be obtained. The small cut at the right represents a section of the clamp used.

The scheme will suffice to print any area of blue print that paper can be obtained to cover—a half-mile square if necessary. The amount of springing required is very small, and never enough to affect perceptibly the uniformity of the printing and tone of the print. If it should ever seem too great it is easy to correct the defect by first springing the board in the reverse direction, then, after drawing the covering felt and papers tight, bending it in the first proposed direction, past the straight line, and as far as may be found desirable to secure good contact. This method has been found to work quite as well as the cylinder.

Weather-Proof Window.

G. W. Everett, No. 11 East Tenth street, New York, is directing attention to a weather-proof window which he is introducing. Fig. 13 of the engravings represents a horizontal section through the window frame, showing the inside and outside stops, parting strip and the sash. It will be noticed the special feature of improvement is a section of rubber introduced into the sash, for the reception of which a segmental groove is cut in the parting strip. The effect of this construction is to cause the rubber, by its elasticity, to spring outwardly against the parting strip, making the construction wind-tight. Fig. 14 of the engravings is supposed to represent a vertical section through the meeting rail of the window. The same feature, it will be noticed, is applied to the upper sash, with the exception that there is not the corresponding groove for receiving the rubber. The wedging of the rubber strip between the two parts of the meeting rail makes a wind-tight joint at this place. The inventor asserts that the device can be applied to old or new work, and he is at present arranging for agencies to handle the material which he supplies and to put it in place with special tools, which he also provides. The matter is of interest to a large class among our readers.

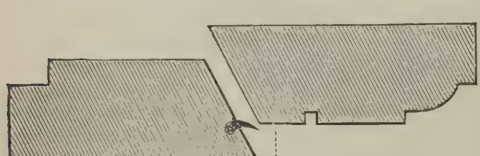


Fig. 14.—Vertical Section Through Meeting Rail with Everett's Improvement.

Improved Bench Drill.

A few months since we presented in these columns a form of bench drill manufactured by Messrs. E. C. Stearns & Co., of Syracuse, N. Y. In Fig. 15 of the illustrations we show an improved form of the same drill, the special feature being the adjustable bed-plate, which may be raised or lowered to accommodate various styles and sizes of work. It is so constructed, it is stated, that by simply turning a crank the spindle is rapidly fed down to the work and as quickly withdrawn. The drill is 26½ inches, measured from the base of standard to top of balance-wheel, and weighs 29 pounds. It is claimed to have a capacity for drilling any size of hole at a right angle with the bed-plate, from ½ inch down to the smallest required. The drill-stock is $\frac{13}{16}$ inch in diameter, the run of the screw 3½ inches and the weight of the balance-wheel 6 pounds. With each drill is furnished a chuck, which attaches to the spindle and holds a $\frac{3}{8}$-inch round drill or an ordinary square-tapered shank or brace drill. The drill is made of the best material, the main standard is neatly japanned, the hand-wheel nickel-plated, the balance-wheel painted vermilion, while the bearings are finished with standard size reamers, with all parts interchangeable. The crank, as will be noticed by referring to the engraving, has an extension for large drilling, and the manufacturers state there are proper allowances for strength and durability.

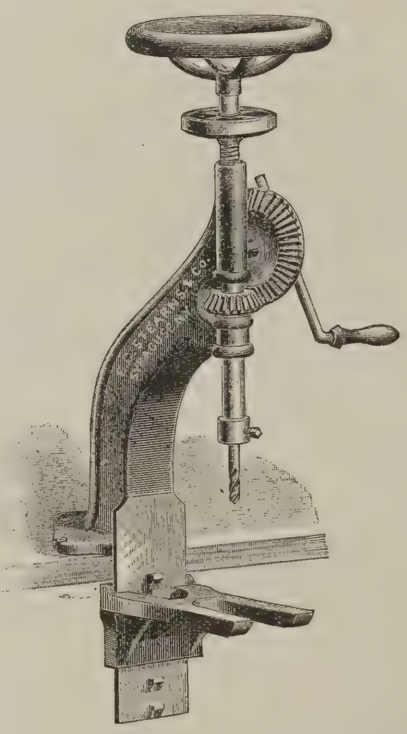


Fig. 15.—Stearns' Improved Bench Drill.

Automatic Screw-Driver.

The Shaver Corporation, No. 157 Broadway, New York, are introducing what is known as Shaver's Automatic Screw-Driver, an illustration of which is presented in Fig. 16 of the engravings. The screw-driver is of the spiral variety, the shank being twisted and working through proper mechanism in the ferrule of the handle, as shown. It differs in various details of construction from other spiral screw-drivers which we have illustrated in the past, and is of a size and character to be very useful for both amateurs and mechanics. The handle itself, which in the sample before us is made of hard wood, measures 9 inches in length. When the screw-driver is extended the total length is 17 inches. The handle where the hand would grasp it is nearly 2 inches in diameter, dimensions which constitute it of more interest to mechanics than is usual with tools of this class. Another advantage is its lightness. The cut shows the method of holding the tool at the beginning of the stroke, the dotted line showing the position of the handle at the end of each stroke. The makers mention that the screw may be driven with this tool without any hole being prepared for the screw, the driver being so powerful that the screw, including the countersink, can be forced into soft wood without difficulty. The whole operation for driving an ordinary screw is accomplished by three straight thrusts of the hand, using, the makers assert, no more power at each thrust than is required by the ordinary method.

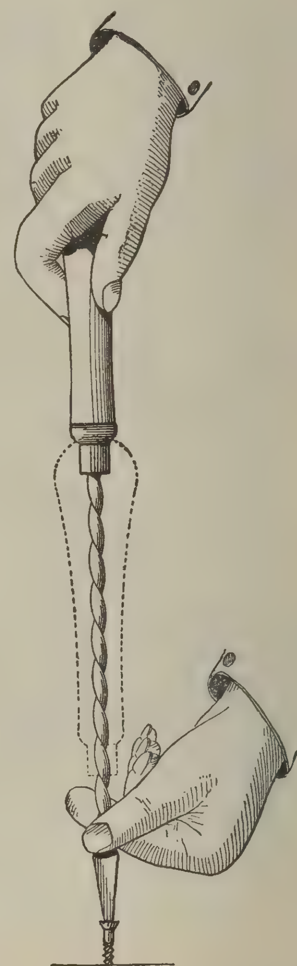
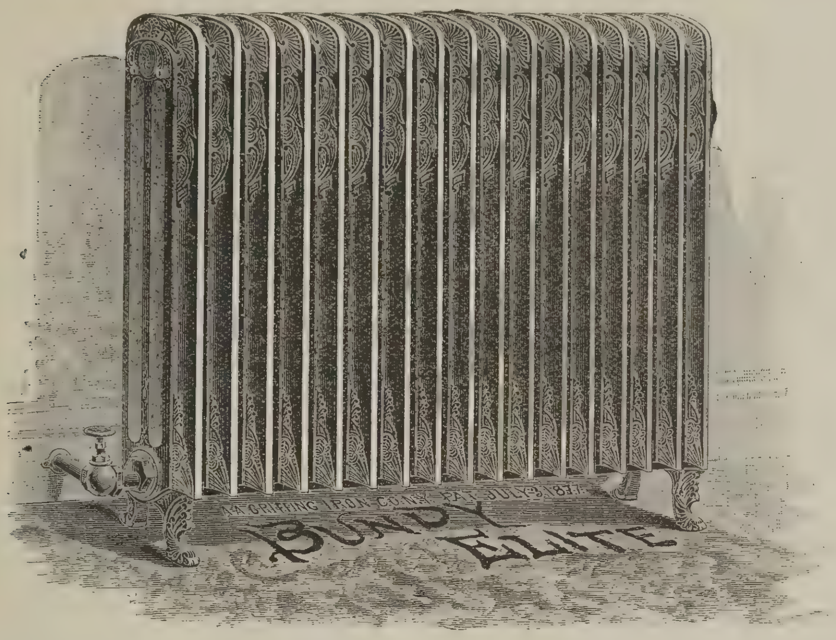


Fig. 16.—Shaver's Automatic Screw-Driver.

New Steam and Hot-Water Radiator.

A new radiator, adapted for either steam or hot water, which has been carefully ornamented in Arabesque design, is just ready for the market, and is offered by the A. A. Griffing Iron Company, of



Novelties.—Fig. 17.—Bundy "Elite" Radiator, Made by the Griffing Iron Company.

Jersey City, N. J. It is to be known as the Bundy Elite. The engraving, Fig. 17, affords the reader a general idea of the appearance of the device. Aside from the ornamentation, the leading feature is the three-pipe arrangement, which favors positive circulation. By referring to the cut it will be seen that the radiator is of the sectional variety, differing from other radiators in the shape and arrangement of the central column. The steam or water passes positively up the central column and down the outside tubes, and, for this reason, always has a forward motion. The larger portion of the surface of this radiator consists of arcs of a parabola, which, it is claimed by the makers, has the effect of bringing more air into direct contact with the heating surface than is secured by other forms. Special care has been taken by the manufacturers to have the openings and inside areas sufficiently large so as to allow for the separation without conflict of the three elements in every radiator--namely, steam, water and air. The Arabesque design which has been applied to this radiator has been taken from the Moorish school. It will be recognized by many of our readers as one of the most beautiful ever applied to a radiator. It is in harmony with the furnishing of modern apartments, and is of a character to look well in any class of buildings. It imparts to the radiator an appearance of lightness, and on this account is likely to bring the present device into demand with those who have taken exception to the bulky and heavy appearance of many of the radiators now in use.

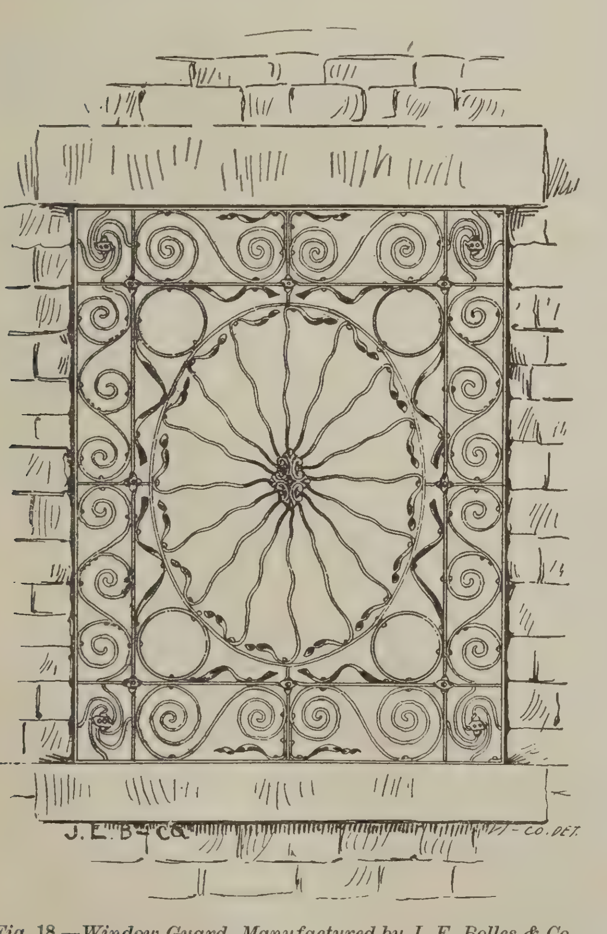


Fig. 18.—Window Guard, Manufactured by J. E. Bolles & Co., Detroit, Mich.

Iron Window Guard.

Every year shows more and more taste displayed in design as well as in features of construction of wrought-iron work. Not only do the architects vie with each other in producing appropriate designs in work of this class for use in various places, but manufacturers as well give special attention to forms in which their material may be worked to produce graceful effects, while at the same time accomplishing the special objects in view. The accompanying design, Fig. 18, represents a window guard recently brought out by J. E. Bolles & Co., of Detroit, Mich. The parts are clearly defined and the work speaks for itself.

Eave-Trough Angles.

Hatten, Galpin & Co., Binghamton, N. Y., have recently introduced patent angles or miters for eave-troughs. Accordingly their well-known product—eave-troughs in long lengths—is being supplied to the trade at the present time with the angles or miters made, thus making the goods more desirable than ever. Several

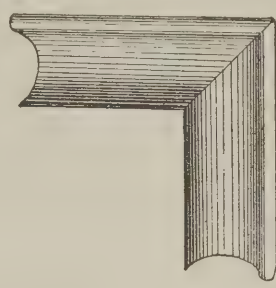


Fig. 19.—Top View of Gutter Miter.

samples of the miters are before us as we write. The pieces of gutter forming the miter, instead of being cut to join edge to edge, are cut to lap. One piece laps over the inside of the other in such a way as to be forced down even and the edge soldered. The opposite arm, however, coming underneath this is swedged or embossed so as to present a projecting rib on the under side, following the lines of the joint and admitting of being soldered against the outer face of the opposite section. By this means two separate soldered lines are obtained, while between them is the pro-

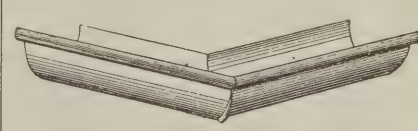


Fig. 20.—Front View of Outside Miter.

jecting rib following the line of the miter, which in itself adds great strength. The resulting joint is handsome, and that it is strong must be evident from the elements of which it is composed. The accompanying cuts serve to show the appearance of the work referred to. Fig. 19 indicates the angle as it would appear in a top view. Fig. 20 shows a miter prepared for an outside angle, having the bead on the front of

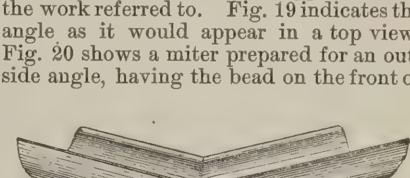


Fig. 21.—Back View of Inside Miter.

the gutter; the rib or embossing is clearly shown in this cut. Fig. 21 shows an angle or inside miter and still further illustrates the appearance of the boss. In a letter recently received from these manufacturers they inform us that they have lately added very largely to their assortment of styles of long troughs. These are at present being made box-shape, ogee-front, half-round, V-shape, &c., and in various grades of materials, including IX and IXX terne plate, IX bright tin, galvanized iron and copper. The firm assert that they are now prepared to make up almost anything that an architect can lay out. They also mention that they are continuing the use of the very best grade of material that is to be obtained, and they feel that the stand that they have taken in trying to encourage the use of good metals has been the cause of an important part of their success in business.

TRADE NOTES.

THE EGAN COMPANY, of Cincinnati, have in press a new catalogue of wood-working machinery which they say will be ready for distribution about the middle of July. It is described as an elegant quarto volume, handsomely bound. They inform us that those of our readers who desire to secure a copy will do well to put their names and addresses upon record for their mailing list, so as to be supplied promptly. We have no doubt that a large number among our subscribers will avail themselves of this suggestion.

THE TIMBERMAN'S Vest Pocket Ready Reckoner, for the use of lumbermen, is the title of a neat little work, published by the *Timberman*, of Chicago, Ill. It contains 44 pages of tables, among which are dimension tables, tables of logs, reduced to board measure, miscellaneous tables, including number of pieces to a full thousand feet of lumber, table showing freights of lumber, weights of windows, doors, blinds, &c. The price of this little work is 25 cents.

THE SECOND NUMBER of the quarterly issued by Frank L. Smith, Architect, Boston, entitled "Homes of To-day; or, Modern Examples of Moderate Cost Houses," has come to hand. The pamphlet contains some 40 pages and the illustrations in it purport to be some of the best examples derived from his practice in the three months preceding its issue.

THE NEW CATALOGUE issued by the Glen Cove Machine Company, 24 to 30 Clay street, Brooklyn, N. Y., has an unusually large page, and contains excellent engravings of the different planing-mill machines which they produce. In view of the fact that this company is one of the youngest in the field in the line which it follows, and that it has introduced facilities both in construction of machinery and in their presentation to the public, more than usual interest centers in the book before us. Following the general design of their machines, several of which have been laid before our readers in the past, there are engravings representing details of construction, pages devoted to testimonials, and then a number of pages containing diagrams of the ground plans of some of the machines, indicating dimensions and proportions that must be made in the way of finding shafting, &c., to receive them. These diagrams will be appreciated by every one who has occasion to investigate machinery of the kind referred to.

WE ARE INDEBTED to the *Builders' Gazette*, of Pittsburgh, for a copy of the constitution and by-laws of the Builders' Exchange of that city. In addition to the matter above referred to the pamphlet contains a classified directory of the members of the exchange.

A NEW ORGANIZATION in Detroit, Mich., is the Architectural Sketch Club, which took definite shape early in May. The object in view is the enlightening of its members on all matters relating to architecture by readings, lectures, discussions and competitions in design. J. L. Saunders was elected president and C. A. Fullerton, secretary. The club starts out with good prospects and with a membership of some 25.

THE HILL DRYER COMPANY, of Worcester, Mass., issue a catalogue of Hill's Champion and Eureka clothes dryers. The Champion dryer may be described as an arrangement adapted to swing like a crane from a piazza post and be readily locked in place. Other forms are adapted to stand in the yard in various positions. The pamphlet is of interest to the trade at large.

P. PRYIBIL, 461 West Fortieth street, sends us a copy of a letter recently received from the A. Gravel Lumber Company (Limited), Etchemin, Quebec, Canada, relating to a band resawing machine, bought a year since. In the course of the letter the following statements are made: We re-saw with it coarse spruce lumber for box making, and use 22 gauge saws 5 inches wide, which take a saw kerf of about 1-20 inch, and it does as much work as a large Smith circular re-saw which stands next to it. We run it according to the various kinds of lumber, from 24 to 40 feet per minute, and intend to put on a 60-foot feed for narrow lumber. Our principal work so far has been splitting 9 and 11 inch deals. To re-saw those widths with a circular re-saw we have had to use at least a 16 gauge saw, so that you will perceive that we save the difference between 16 and 22 gauges, both in the thickness of the lumber and in the power. In a great deal of the work we do the band saw enables us to get six pieces out of a 3-inch deal, where we can get only five with a circular, and although it is only common lumber the saving to us is at least, in that case $10 to $12 per day. We are running this machine 520 revolutions per minute, and in the last month have brazed only two breaks, although the machine has been running continuously ten hours per day.

MR. A. G. NEWMAN, successor to Newman & Capron, No. 1180 Broadway, New York City, has issued a four-page circular of sliding-door sheaves, of which he manufactures an extensive variety. The feature of the circular is a full-size illustration showing the manner in which parlor sliding doors are hung, the various parts being lettered for convenience of reference. A price list is also presented, together with other matter of general interest in this connection.

THE CHICAGO SPRING BUTT COMPANY, inform us that owing to a very general solicitation from their customers for a telegraph code, they have prepared something which would seem to answer the purpose. A copy of it is inclosed in the letter giving us this information. It is a very simple code in its features, and yet would seem to be well adapted for the purpose in view. It makes telegraphing for goods almost as cheap as writing for them, when time is considered. The company inform us that their line of spring hinges is so extended that dealers very frequently have orders for sizes or finishes which they do not carry in stock; and, accordingly, the code becomes very useful in such cases.

WE ARE indebted to W. & L. E. Gurley, Troy, N. Y., for a copy of their hand-book of civil engineers' and surveyors' instruments. The work contains some 70 pages, is profusely illustrated and contains engravings and descriptions of many articles which are of great interest to engineers, architects and builders. The goods are standard and have a well-merited reputation in the market.

WILLIAM P. WALTER'S SONS, 1233 Market street, Philadelphia, have sent us a copy of their seventh edition of woodworkers' tools. The catalogue is a very large octavo of upward of 200 pages, and is profusely illustrated. The selection of cuts has been judiciously made, and there is much in the book to be of interest to mechanics in general. Nothing short of a complete index of its contents will give a conception of the large assortment. The book has been specially prepared for mail-order business, and at the outset directions are given for obtaining goods by mail. The volume is one that will be welcomed by many of our readers. In the circular accompanying the catalogue it is mentioned that 800 illustrations are presented, many of which have been specially prepared for this edition. A very extensive line of foot-power machinery, adapted to the use of carpenters, is also contained.

THE CHARLES W. SPURR COMPANY, New York and Boston, brought their carvings to the attention of the members of the Master Car Builders' National Association, by means of a little pamphlet prepared expressly for distribution at the meeting of that body, about the middle of June. The little book consisted of ten pages of text, descriptive of the processes of making veneers, bound in tinted paper cover. The title, printed in red, was as follows: "For Car Builders; Wood Carvings for Almost Nothing."

SEVERAL NEW TESTIMONIALS to the efficiency of their machinery are presented in another part of this issue by the Fairhaven Mfg. Company, Fairhaven, Mass., manufacturers of the Fairhaven Universal wood-worker.

THE NEW CATALOGUE issued by the Garry Iron Roofing Company, Cleveland, Ohio, is a pamphlet of nearly 60 pages, and contains a very complete description of the various styles and lines of goods made by this concern. It is something which every carpenter and builder should be interested in sending for. The diagrams for measurements and directions for ordering will be generally appreciated by our readers.

THE DODD SHUTTER WORKER COMPANY, 26 Church street, New York, announce that their worker, which has been known to our readers for some time past, can be procured through the hardware trade generally, or where not supplied in this way can be ordered direct

THE THORN SHINGLE AND ORNAMENT COMPANY, Philadelphia, mention in their advertisement this month that they are at present manufacturing eight designs and sizes. The roofing and wall tiles produced by this company are ornamental, and are general favorites wherever introduced.

THE BARNES TOOL COMPANY, 958 Grand avenue, New Haven, Conn., request the trade to send for circulars with names and testimonials which they have ready. They mention that there are 1200 of their machines in use, every one of which is declared to be a testimonial in itself.

THE OMEGA GRATE COMPANY is the name of a new organization in Chicago, Ill, which succeeds the Omega Stove and Grate Company, of Cleveland, Ohio. The address of the new concern is the Pullman Building. The new organization will continue the manufacture of the Omega fireplace furnaces, an article which has many features to recommend it to use, and with which a large number of our readers are already acquainted. It is claimed to be a perfect ventilating hot air fireplace furnace.

THE SENECA FALLS MFG. COMPANY, 290 Water street, Seneca Falls, N. Y., present on another page an attractive line of the foot and hand power labor-saving machinery which they manufacture. The prices are mentioned, enabling every one to intelligently consider the question of buying upon inspection of the advertisement.

THE CONROY REFRIGERATOR DOOR FASTENER, made by P. J. Conroy & Co., Sixteenth and Catharine streets, Philadelphia, which was patented December 15, 1885, is making many friends among the builders. It has the advantage of locking the doors securely in place and yet be readily released.

A NEW CATALOGUE issued by Snedeker & Voorhees, of Jamesburg, N. J., has just come to hand. The foot and hand power wood-working machinery illustrated in this book comprise a very full line, and in the way of combination machinery presents a number of ideas which cannot fail to become popular among our readers.

WE HAVE RECEIVED from C. B. Demorest & Co., 272 Kent avenue, Brooklyn, E. D., N. Y., a catalogue of their seating adapted for use in halls, churches, theaters, &c. The book is one that should be in general request by all who have any work of this kind to put up. Balcony fronts are also included, together with chairs for use in public buildings.

A. J. WILKINSON & Co., Boston, who manufacture a folding adjustable draw-knife, which is illustrated and priced in another part of this issue, announce a wood-workers' tool catalogue 100 pages in extent.

CHARLES E. LITTLE, 59 Fulton street, New York, carries a full line of W. F. & J. Barnes wood-working machinery, which he offers at factory prices. In his card, in another part of this issue, mention is made of the medal received at the American Institute Fair.

THE NATIONAL SHEET METAL ROOFING COMPANY, of New York City, announce in another part of this issue some changes in their agencies. Thomas McDonald & Co., of Toronto, succeed McDonald, Kemp & Co., and Knisely & Miller Brothers, of Chicago, become the agents for these goods in that city.

THE SCOTT & BITTING PAPER COMPANY, 611 Commerce street, Philadelphia, request the trade to send for samples and price lists of manila and rosin-sized building paper, which they are manufacturing.

MERCHANT & Co., of Philadelphia, present in this issue a very succinct description of their leading brand of roofing tin—namely, Gilbertson's Old Method, and point out its leading features, and allude to the success with which it has been used on different public buildings.

KNISELY & MILLER BROTHERS, of Chicago, present in another part of this issue a card illustrating and describing their business in a very comprehensive manner. It combines elements in the way of trade-marks, &c., which have long been associated with this firm's name.

THE CINCINNATI CORRUGATING COMPANY in their card in another part of this issue present some good advice on roofing matters.

WE HAVE received from Edsell Totman, LaGrange, Cook County, Ill., a catalogue of Totman's patent ready-made houses. The proposition is to furnish an expeditious method of constructing dwellings at moderate cost, and to enable the purchaser to erect his own dwelling when necessary without the aid of skilled labor. In accomplishing this end Mr. Totman claims to have departed entirely from the old beaten paths and to have struck out in new directions. Various features of construction are illustrated in the catalogue all of which are of undoubted interest to our readers.

THE PEERLESS MFG. COMPANY, of Louisville, Ky., have issued a catalogue of liberal proportions, which has more or less of interest for architects and builders. It consists of some 25 plates, presenting a great variety of artistic iron linings and portable basket grates. The designs are very handsome, and give evidence of great care in their execution.

TWO UNIQUE PHOTOGRAPHS reach us from the Gage Tool Company, Vineland, N. J. The special point on which this company pride themselves is the quality of the metal that is used in their plane bits. The photographs in question represent portions of hemlock boards in which some ugly knots occur and over which eye witnesses to the performance have written their testimonials. One of the photographs is indorsed as follows: "We witnessed Mr. Gage plane over this hemlock knot over 300 times and then cut a hair from his beard without sharpening the plane bits, as we would with our razors." This is duly signed by two of the witnesses. Another testimonial mentions 303 times in the same general terms.

WE HAVE RECEIVED from the Lufkin Rule Company, Cleveland, Ohio, a copy of their illustrated catalogue and price list of steel rules and tapes, steel board rules and other specialties. Some of these goods have already been illustrated in our columns, including the folding pocket rule and the "Perfection" glass board. The catalogue is one of general interest to our readers.

THE WORD "cantilever" is frequently encountered in architecture and building. More recently it has come into general use on account of its application to one of the famous bridges across the Niagara River. The word, which is also sometimes written "cantalever" is from cant, an external angle, and lever, a supporter of the roof timber of a house. In architecture it may be described as the projecting block or bracket that supports a balcony or the projecting eaves of a house. Accordingly a cantilever bridge is one similarly supported by brackets extending from the abutments.

THERE are 78 pupils in the Hebrew Technical Institute, New York City, and at the recent annual commencement the first prize for both wood and metal-work was awarded to a pupil named Abram Chankin.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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VOLUME X. NEW YORK, AUGUST, 1888. NUMBER 8

NOTES AND COMMENTS.

THE present condition of the new Croton Aqueduct and the future of the water supply in New York City are subjects incidentally touched upon by General Newton, Commissioner of Public Works, in his testimony before Senator Fassett's investigating committee. General Newton thought the tunnel would be completed in a few months. He estimated the cost of the work at about $16,000,000. The General said that he expected that the city would be supplied with water as soon as the tunnel was completed, but qualified that statement later by saying that the supply would benefit the citizens as soon as the reservoirs are completed, which he thinks will be in about five years. There will be an abundance of water in five or six years. One reservoir will hold about 9,000,000,000 gallons. The construction of these reservoirs and the dam was opposed by citizens, and therefore the work was greatly delayed. The question whether the Quaker Bridge dam should be a straight dam or a curve had been submitted to three distinguished engineers. Until a decision had been arrived at by them it might be said there would be no plans in existence. He thought $6,000,000 would cover the expense of the structure. The dam could be constructed safely in six years.

MANY of our readers have already had their attention called to the increasing value of cypress as a wood for building purposes. A correspondent of one of the daily papers, referring to the value of cypress, says: "Northern and Eastern markets will in a few years be almost entirely dependent upon Southern woods for fine lumber. Northern capital is pushing into Kentucky and Tennessee, and is also dotting Florida and the Carolinas with mills in the lumber regions, for the reason that many of the Northern fields have become exhausted so far as certain classes of fine lumber are concerned. One of the coming woods that will be universally used for fine trimmings in a few years by Northern builders is the cypress. Cypress shingles have been popularly known in the North for many years on account of their durability. But only in the past two or three years has the value of cypress for building purposes been recognized in the North. The Southern States have been utilizing this wood for building material, and have found it to be one of the most desirable woods as yet known. It is similar in figure and grain to Georgia pine, and is susceptible of a very fine polish, and, therefore, is used principally for wainscoting and inside furnishings. It is a soft wood, and when dry is of about the same texture as white pine. While a general product of all the Southern States, where it grows on the lowlands, yet the best cypress comes from Florida and Louisiana. This is true, not that the wood growing in those States is any better, but for the reason that the millmen there know how to work it into smoother and better lumber than is manufactured elsewhere.

AMONG the current summer and autumn exhibitions, one of the most prominent is the Centennial Exhibition of the Ohio Valley, which opened at Cincinnati July 4. It is described by those who have visited it as one of the finest exhibitions ever held in the United States, in many respects surpassing that of 1876 at Philadelphia. The various exhibits were early got in position and the attendance has been very large from the outset. There are many features about the display of interest to builders, including not only exhibitions of machinery and tools, but also building appliances, roof trimmings, plumbing goods, &c. As many of our readers have already gained from the daily papers, a feature of the exhibition is the house in which General Grant was born, which has been removed bodily from its former location and set up in Cincinnati for exhibition purposes.

A WRITER in an exchange devoted to engineering and mining dwells upon some characteristics of American architecture, and says: In private dwellings we have no distinctive American types except the red brick, marble step and trimmed, green-shuttered Philadelphia pattern; the two-chimneyed, false-wall, arched-transom Baltimore style, or the high-stoop, brown-stone veneered New York sort. All the newer houses are reproductions or compilations of European schools. A California railroad magnate builds a gigantic French château in wood; a Chicago distiller modestly dwells in an Italian villa; the seashore cottager tarries in a Swiss châlet; the suburban grocer inhabits a Norman castle, and the New Yorker, who economizes by keeping a winter house in Washington, turns his affections toward grotesque Queen Anne and Eastlake caricatures. All this in a few years will look very odd, just as do the Greek temples in which good Americans of one and two generations back delighted themselves.

THE most sensible of our new buildings are the great office structures. They embody no distinctive architectural style, but they are, as a rule, substantial, well heated, lighted and ventilated, generally fire-proof, so far as inside risks are concerned, and are better fitted with elevators and other conveniences than foreign buildings of the same class. The country has been very prosperous of late, and there are countless of the new rich who wish to distinguish themselves by affecting high art dwellings. But the models chosen keep in fashion only a few years, and the latest European copies will go out of mode as surely as the horse-hair, veneered furniture, the what-not cabinets, and the camphor aroma of our grandmothers, or the blue placques and repoussé armor of our aunts. It is by no means desirable that all the buildings of a country should be patterned on one design, like so many canal boats; but it would be a relief to see something original that is not fantastic. When the craze for ornamental architecture has subsided, as it surely will, we may expect to see buildings planned with some regard for their purpose, and, as in the case of the large new office hives, a less flimsy system of construction than would have passed muster a few years back. If a pronounced and lasting American type is ever developed it will be in the direction of practical utility and adaptation of means to ends, thus following the bent of mind which has shown itself in machine designing.

THE use of common salt appears to be of increasing importance in connection with building materials. Among the carpenters the article is now found to be an aid in the heating of glue, and where, as has been usual in joiners' and cabinetmakers' shops, the glue is melted in a jacket kettle surrounded by water, it is said to be an improvement to place salt in the water of the outer kettle—that is, the addition of salt raises the boiling point, and therefore enables the glue in the kettle to be kept at a higher temperature than could be maintained with water alone, and this is advantageous to the work. Again, masons find their use for salt in adding it to cement mortar in cold weather to preserve it from the injurious effects of freezing. It is known that, in many cases, masonry has been laid in cement in cold weather, using a considerable proportion of salt in the mixture, which after repeated freezings and thawings has remained in perfect condition, while work near by laid in mortar of the same kind, but without any admixture of salt, became disintegrated by the frost.

WE have frequent occasion to admire the enterprise which characterizes the inhabitants of the "new towns" of the country. They realize the necessity of calling the attention of adventurous spirits elsewhere to the opportunities still existing for the rapid accumulation of wealth. They appeal most strongly to the residents of the older East, whose surroundings have become more or less rigid by an apparent development of wealth-producing influences to a point of slow growth. Many turn anxiously toward some newer

section of the country with the American hope in their breasts of "bettering their condition." The channel most convenient to reach these people sighing for a change of condition is the newspaper. Much is being accomplished by the press of the new towns in this direction. The "special editions" coming under our notice from time to time are almost invariably highly creditable to the towns whence they emanate. Whether they originate in the South or the West they breathe the true spirit of progress, and although too apt to exaggerate advantages and conceal defects they are a very important factor in securing a diffusion of population which is perhaps of as great consequence in this vast country as the direct pecuniary benefit of the individuals influenced.

WITH the extensive and constantly growing application of wind-power, specially noticeable in the West, where the windmill for pumping has become a familiar landmark, it is all the more noteworthy that this motor has not been pressed into service to any appreciable extent for isolated electric lighting on the storage battery plan. It cannot be because of lack of efficiency on its part, as the contrary is being demonstrated daily, and the low percentages of accumulated energy hitherto yielded by storage batteries may therefore, with some reason, be held accountable for the neglect which has been shown in the matter. Even this cause, however, if such it be, has of late lost in importance, the development and improvements in the manufacture of storage batteries having been such as to impart to them a reasonably high degree of efficiency. While the correctness of the remarkably economical figures claimed for some of the types now in the market may well be questioned, an average return of at least 60 per cent. of the electrical energy put into an accumulator may be expected, and with this a combined windmill and storage battery plant should, in certain locations, offer superior inducements as a means of supplying electric light. The power, strictly speaking, costs nothing beyond first cost of the motor and interest, the expenses of maintenance and wear and tear, and the sum involved in procuring the dynamo and batteries, whether in the shape of a price with interest, &c., paid for their purchase outright or in the form of a fixed rental, paid to a controlling company. The necessarily fluctuating character of the power would scarcely be very objectionable since the energy would be stored whenever available, at intervals perhaps, in comparatively small amounts, a large enough storage capacity being provided, and drawn off when desired. The working expenses would be small and the power supply sufficiently reliable for the purpose to be accomplished. In only a few cases, however, that we know of has advantage been taken of the system, and then mainly for experimental purposes.

A RECORD of the results obtained in one instance was given a few weeks ago in a paper presented to the Glasgow Philosophical Society, and, though rather incomplete, was none the less valuable because of its direct practical significance. Professor Blyth, the author, had fitted up a small windmill plant for lighting a cottage, the windmill being after old English type, erected in the garden. The tower consisted of a wooden tripod, suitably braced, and supported the wind shaft 33 feet above the ground; four sail arms were used, each about 13 feet long. The dynamo, also an old form, was driven directly through a rope and charged 12 cells. With this arrangement ten eight-candle power lamps were easily supplied, and, with a good breeze blowing, as we find it stated, there was sufficient storage in half a day to supply the lights for four evenings of about four hours each. A cut out arrangement disconnected the cells from the charging circuit when the dynamo ran below a certain speed, so that the action was entirely automatic and the windmill could be allowed to run day and night without danger of the cells discharging themselves through the dynamo. The possibilities of this plant, with all its imperfections, afford some measure of what might be accomplished with improved appliances and should encourage further work in the same line. With windmills of the latest type, storage batteries and dynamos of modern construction and a general improvement in all the working conditions, as now attained, additional experiments would be well worth trying.

THE PLATES.

In Plate XXIX we show a design of a summer-house built above a tool-house—that is, the summer-house is two stories in hight, the lower story being devoted to the storage of tools. The design is in some respects similar to others in general conception that have been laid before our readers. It is covered with a thatch roof, which adds much to the picturesqueness of the design and serves to make it attractive in many places. Of course the same features of design can be carried out, substituting a tile roof or with a roof covered with one of the numerous attractive patterns of shingles now available to the public.

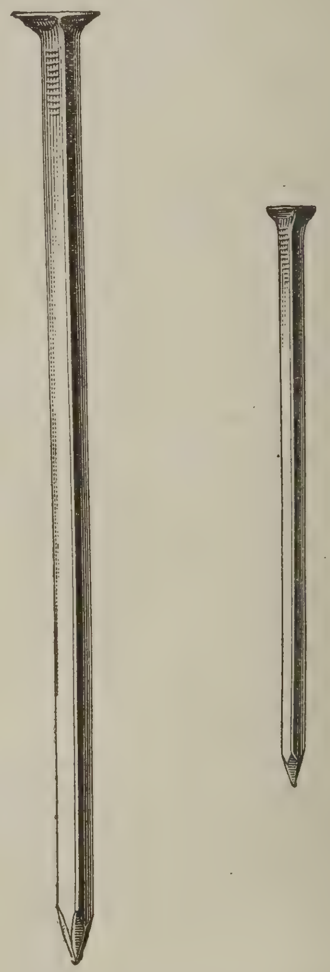
In Plate XXX and XXXI we show a number of chairs belonging to famous persons. The names of the owners or users are indicated in the plates immediately under the several designs. Referring to Gay's chair, it is described as a pleasant relic and a very curious specimen of ingenious adaptation of means to an end, forming not merely a seat but also a desk for writing, or a cabinet to hold papers, and a complete receptacle for the holding of pens and ink, and at the same time having sconces for candles. Theodore Hook's chair is of the Cromwell period and was made also to be used as a table, the circular back coming down and resting solidly on the arms. Lord Lytton's chair is circular, made of walnut wood, and may be described as Jacobian in date. The small, stiff, square-armed chair of oak, perched up in full view on an improvised dais, is the crown of the collection—namely, the chair in which Shakspere wrote many of his immortal plays. The fire-screen standing back from the chairs of Anna Bullen and Mrs. Siddons belonged to Dr. Johnson and is appropriately shown in this collection. A study of the styles presented, and a comparison with modern chairs, cannot fail to be of interest to our readers.

In Plate XXXII we show a wall-paper pattern brought out by a leading London firm, the design being prepared by G. Haité. The design is an exceptionally good one, being well-planned in weight of work and nicely covered, without any lines or spaces to mar the effect when joined. It is made as a single print pattern and is supplied in a variety of artistic colors. The border is Assyrian in character, while the frieze and filling are Gothic in feeling and tempered with a touch of Italian delicacy.

Curious German Nails.

Mr. J. C. Bayles, President of the Spiral Weld Tube Company, East Orange, N. J., sends us the following experience with some foreign Nails which we take pleasure in laying before our readers:

A few days ago I received from Germany a large case containing a gas compressor from the works of the Pintsch Gas Company, in Berlin. It was a rather

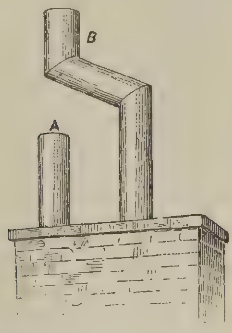


Curious German Nails, Full Size.

serious matter to open it. Crow-bars were necessary, and the only way to get the machine out was to break the case into small pieces. The Nails which held it together were different from any I have seen, and I can bear testimony to their tenacity of hold in wood. I send you a handful of these Nails as a contribution to your museum of Hardware curios, and under the impression that you might like to illustrate them in *The Carpentry and Building.* From their peculiar shape we might imagine they were made from old bayonets. They have been a source of much speculation to our carpenters and pattern-makers, who cannot agree as to the way they should be driven with relation to the grain of the wood. One shrewd old fellow, after looking one of these Nails over very carefully, remarked that he could not see as it made much difference about the direction of the grain than it would in cutting a barrel-head out of a board. I guess he was right.

Saunterings Among the Chimney-Tops of London.

Some one has said "that when the wealthy American dies he goes to Europe." The truth of this statement is something the writer does not vouch for, yet there is no doubt but there are many objects of interest to be observed on the other side of the big pond. This is much more to be the case when a person is so fortunate as to have eyes that can see (to understand). Thinking that some of the many readers of *The Metal Worker* would like a trip abroad, they are respectfuly invited to accompany the writer for a short trip among the chimneys of London. The tinner that has invented a new style of chimney-top that will make any kind of a chimney draw, regardless of circumstances, is the one that will enjoy the trip most, for he can then see what a howling wilderness the great city is without his patent chimney-top. Circumstances prevent our going into the steamer's kitchen and observing the styles of tinware there used, and many other points of interest to a worker of sheet metals, but, arriving at our destination, we will at once mount the roofs and take a rather improbable walk. Fig. 1 introduces us to a chimney on a building at Cornwall Terrace. The pipe *a* is not very hard to understand, though it is evident that the person who put it on the chimney was rather young in the business and not as venturesome as the manufacturer of *b*. Just what the double bend is for would appear to be a mystery, without it is to keep the rain out of *a*.



Chimney-Tops of London.—Fig. 1.—In Cornwall Terrace.

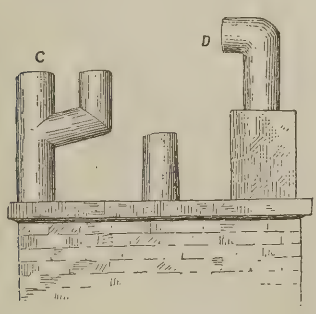


Fig. 2.—New Library—Temple.

A chimney on the new library (temple) has some curious examples of tops, Fig. 2; *c* is a revelation, the elbow on the side is evidently for the purpose of helping the main pipe when there is a rush of business. The disadvantage of such a top is, that it will catch twice the amount of rainwater that its quiet neighbor would at the right; *d* is better adapted to keeping out the rain than *c* and appears to be gazing in quiet wonderment at *c*, to see what it will do next. This style of top is of great service in a country where the wind blows from the same direction all of the time. If the wind was to change, of course a person could go on top of the house and change the direction of the elbow. To the man who does not like to go to church such a cap would be invaluable; he could predict a change of wind about church time, and so stay at home to be ready to alter the chimney-top.

Fig. 3, with its 12 flues, would pass for a healthy chimney in any country. It is located on Furnival's Inn. The top *e* is of a kind that can be seen in our own country, and those of the readers who happen to live in Chicago can see the like of it at the foot of North State street, on one of the freight warehouses. What a history might be written about how the single top at the right came to be put on that particular flue. What an amount of "kicking" there might have been before the owner consented to have the top put on, and how the person that used that particular flue must have gloried over the other 11 that did not have a sheet-iron extension to their chimneys. Some smoke coming out of one of the chimney-pots ought to have been introduced in the cut to prevent the reader from taking the pots for a colony of bee hives. If the top on the new library chimney was a revelation, the one on the Admiralty, Fig. 4, is an inspiration. There is one advantage about it, however, no matter from which direction the wind may blow, there must be one of the pipes that the wind cannot get into. Accordingly, there is an elegant opportunity provided for the egress of smoke, to say the least.

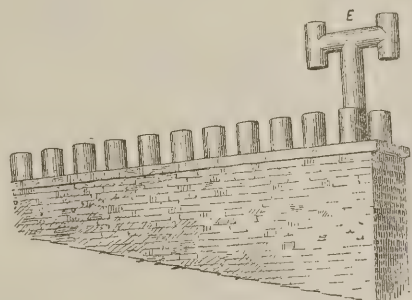


Fig. 3.—Furnival's Inn.

The other evening the writer was looking over Vol. I. of "Tallis's Illustrated London," and, as the curious chimney-tops were noticed, it was thought that perhaps the readers of *The Metal Worker* would like to see some of them, so copies of the drawings were made, and that is all the foundation there is for the supposititious trip abroad. The writer does not know that these tops are really on the various chimneys named, but it would be curious if an artist could think up such things, particularly a top like the last, Fig. 5. The clock that is placed in front of St. Swithans Church (Cannon street) is in such a location that the passer-by can tell what time it is without going into the country. This makes the writer think it is a good time to stop.

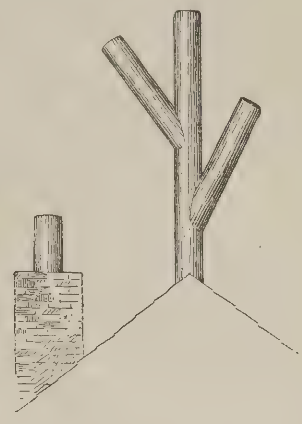


Fig. 4.—The Admiralty.

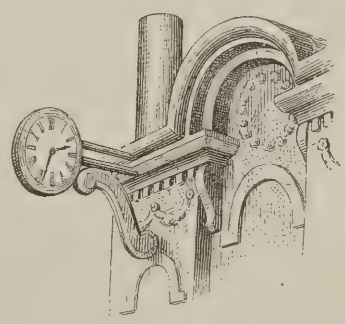


Fig. 5.—St. Swithins Church, Cannon Street.

Misuse of Tools.

Many of our readers have observed the tendency of a certain class of workmen to use anything else but the appropriate tool for a piece of work in hand. The following neat parody of an old song expresses the idea in a way to be interesting:

There was a fellow in our shop,
His work was at the bench,
And every time he struck a blow
He used the monkey-wrench.

And when he found his wrench was gone,
With all his might and main,
He went and got his neighbor's wrench
And commenced to strike again.

A Model Manufacturing Establishment.

It is not often that builders whose operations are restricted to local demands have the opportunity of inspecting large manufacturing establishments in all the details, and thus learn what the requirements of modern manufacturing are, with respect to economical arrangements, transmission of power, location of machinery, provisions for moving material and finished work, &c. We think, therefore, that a description of the new shops of the Pond Machine Tool Company, recently erected at Plainfield, N. J., will be of more than passing interest. The company manufacture machine tools ranging from very small articles to the heaviest required in locomotive and marine engine work. In designing the new shops, which have just been completed, it was determined to obtain all the best modern facilities with the view of handling all detail and general work with the utmost rapidity and the least possible labor.

The general plan of the whole establishment, which we give on this page, shows the relative positions of the different buildings and railroad tracks, and will more clearly explain our reference above to the convenience of handling the various materials in the process of manufacture. The works are on the left of the main line from New York, and the visitor thus naturally first enters the machine-shop building through the general offices at the left. In Fig. 3 we show cross-sections of both machine shop and foundry, explaining the constructive features of the buildings, both it will be noticed being in these respects alike. Running the entire length of the machine shop is a track by means of which material may be delivered at any desired point in the building. At the lower end another track passes off at right angles through a storeroom into the foundry, a turn-table, as shown, admitting of ready transference of the car used from

one track to the other. Above the track and the spaces on each side of it are two large traveling cranes rated at 10 tons capacity each, but capable of easily handling 15 tons. They were built by the Morgan Engineering Company, of Alliance, Ohio, and travel the whole length of the shop, being operated by a 3-inch square cold rolled driving shaft, turned at the bearings in the usual way, and made in one piece without any joint whatever. It is 504 feet long, weighs 7½ tons, and is without doubt by far the longest one-length shaft in the world. In the foundry is another of the Morgan Company's traveling cranes capable of lifting 30 tons, and entirely similar in arrangement and construction to the other two. The cross section of the foundry shown on page 166 will prove of interest in connection with this. The attendant of each crane has full control of its various operations, cross and longitudinal travels, and hoisting and lowering, as well as the starting and stopping of the main driving shaft. In the building of machine tools, each detail is quickly handled by these cranes and placed in proper position. When an ordinary tool is completed with all details attached, one of the cranes is brought over it and the whole machine is quickly lifted into a railroad car for transportation. Thus what generally takes considerable manual labor and a long time, is accomplished in a few minutes, the only labor required being to effect a sling attachment with the cranes.

In the machine shop, of which we publish a separate plan, Fig. 2, the space between the central track and the rows of posts which support the roof and traveling cranes is used as an erecting floor. The erecting pit is located as shown, and is 100 feet long, 10 feet wide, and 6½ feet deep. It has a cement floor, and is walled up with brick. Ordinarily the pit is covered by sections of flooring which are easily removed should occasion require. On this side also a 70″ x 70″ x 35 foot planer has been placed, though many of the heavy machine tools are located on the other side of the track and between it and the other row of posts. A 60″ x 60″ x 24 foot planer has been put in almost opposite the erecting pit since our engraving was made, and a slight change in the placing of the immediately adjoining tools was therefore necessary. The spaces between the two rows of posts and the outer walls are given up almost wholly to the regular run of smaller machine tools, the engraving showing their location and giving their sizes. The following abbreviations have been used:

L. Lathe. VD. Vertical drill.
SL. Speed lathe. BM. Boring mill.
BL. Boring lathe. B & SG. Brown & Sharpe grinder.
MM. Milling machine.
GC. Gear cutter. P. Planer.
CG. Cutter grinder.

For the handling of the lighter work in these wings small traveling cranes worked by hand are provided, the single and double rail systems both being used. The large traveling crane in the foundry has full command of the floor space between the two rows of roof supports exactly as in the machine shop arrangement, enabling the ready transportation of castings, flasks, ladles, &c., over the full length of the foundry and the handling of the heavier work which is there done, such as planer bed castings, turned out in sizes weighing as much as 18 tons. A number of jib cranes, fitted to the roof posts, are employed for the work in the side spaces which is of a lighter order, and for handling also whatever small work there may be in the central portion of the foundry. These cranes, one of which is seen in Fig. 1, were made by Messrs. Ribon & March, of Jersey City, N. J., and are fitted to turned portions of the posts in the manner shown. We should remark here that in the foundry cast-iron roof posts are used, while in the machine shop they are of wood. Ball bearings are used in connection with the cranes, so that they can be managed with the greatest ease, yielding to but a slight touch. In case it should be desired, every post in the foundry can be provided with a crane of this kind. It

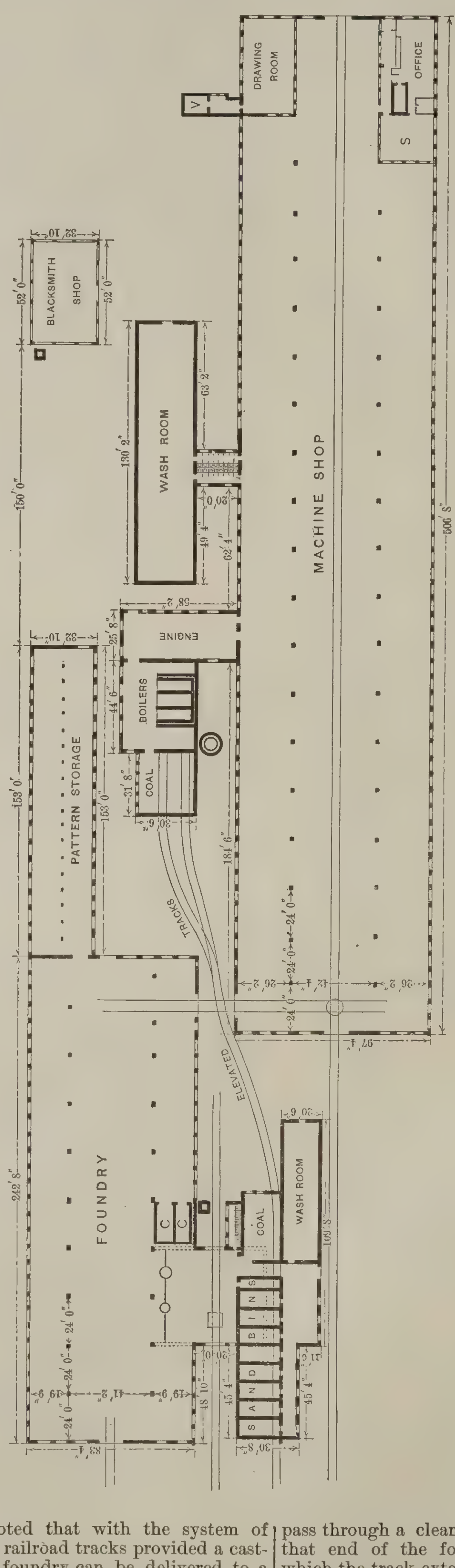


Fig. 1.—General Ground Plan of Works.

THE NEW WORKS OF THE POND MACHINE TOOL COMPANY, AT PLAINFIELD, N. J.

will be noted that with the system of cranes and railroad tracks provided a casting in the foundry can be delivered to a car on the track which extends into one end of the building, thence rolled into the storeroom in the machine shop building, where the proper entries concerning it would be made, and then continue on into the machine shop proper, where by means of the turn-table and track, or the traveling cranes, it could be delivered to any desired point. The neatness of this arrangement will be readily appreciated. Before leaving the foundry the castings pass through a cleaning room situated in that end of the foundry building, into which the track extends.

Returning to the machine shop our readers will notice that on the left of the central track there are, besides the private and general offices, as already mentioned, the

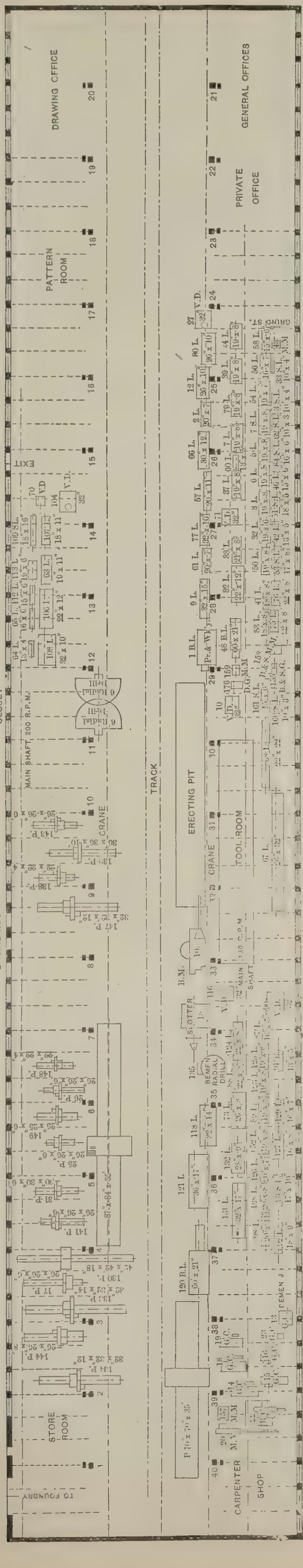


Fig. 2.—General Plan of Machine Shop Building.

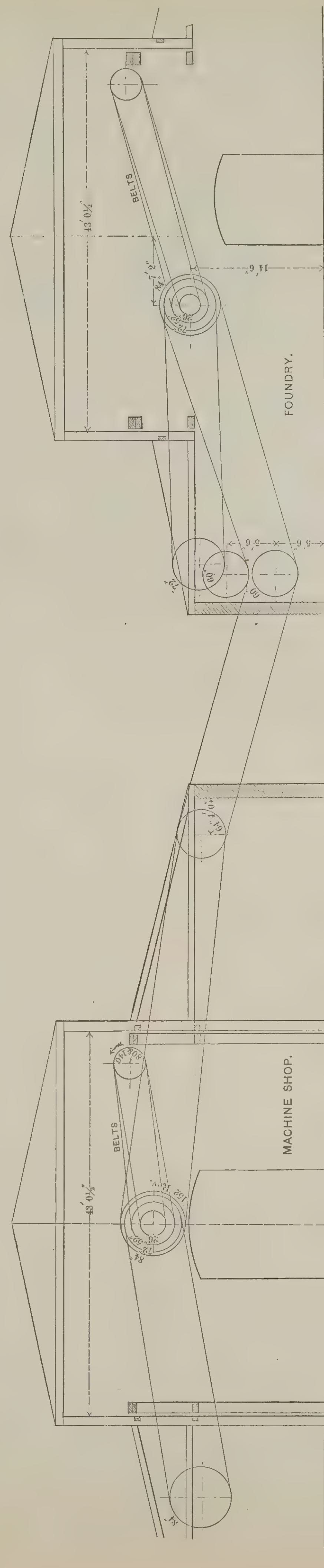


Fig. 3.—Cross Sections of Machine Shop and Foundry.

THE NEW WORKS OF THE POND MACHINE TOOL COMPANY, AT PLAINFIELD, N. J.

tool-room and carpenter shop, while the store-room, pattern department and drawing office are on the right. Adjoining the last, and on the outside, as shown in the ground plan, Fig. 2, is a fire-proof vault, in which duplicates of all drawings are kept. Above this vault is a room fitted up with all facilities for blue printing. Passing further down we come to the washroom. This has a cement floor, and is provided with a number of cast-iron wash sinks supplied with water from a large main pipe having suitable branches. Steam pipes enter the large pipes for heating the water. The washroom attached to the foundry is similar in plan, and is provided with clothes closets, one for each workman. The sanitary arrangements throughout are admirable.

Power for the whole establishment is furnished through a 30-inch belt by a 200 horse-power automatic engine, built by Messrs. C. H. Brown & Co., of Fitchburg, Mass., steam being supplied by three ordinary tubular boilers of 100 horse-power each. In the engine-room, moreover, is a 100 horse-power double engine of the latest type, built by the Armington & Sims Engine Company, of Providence, R. I. This is used for electric lighting, the Westinghouse alternating system being employed. There are altogether 650 incandescent lights sufficient for thorough illumination. The total length of line shafting in the machine shop is 1250 feet. An exceedingly interesting feature of the power plant is the manila rope transmission which was put in the works by the Plymouth Cordage Company, of Plymouth, Mass. Fig. 3 will explain the main features of the system. From the shaft in the machine shop, driven directly from the engine, the ropes (four in number) pass to a central set of sheaves and thence three ropes pass to the opposite side of the shop delivering power to the machine tools placed there. On the same short shaft with the central sheaves are mounted two smaller belt pulleys, from which pass belts for driving the traveling cranes. Belts were there thought preferable, on account of the smaller diameters of pulleys which it was desired to use. From the machine shop four ropes pass into the foundry building, first downward, for obvious reasons, and then upward to a set of sheaves placed near the center. From there three ropes pass to one side, driving the shaft from which power is taken for rattlers, breaker, power riddles and a large Root blower supplying the blast for the melting cupolas. Belts are also led from the central sheaves for the power shaft of the traveling crane. It will, of course, be understood that the ropes on the different sheaves are carried side by side. The ropes are $1\frac{3}{4}$ inches in diameter, and each one, at a speed of 1000 feet per minute, is rated to deliver 10 horse-power. The design of the sheaves—in fact, the details of the whole rope system, are based on experience gained in England, where rope driving is used probably more extensively and with greater success than in any other country. As a result the performance of the plant at the Pond Company's works has proved highly satisfactory in every respect, the smoothness of running being immediately apparent to even the casual observer. The grooves in the sheaves are of peculiar form, preventing wedging of the ropes and permitting them to leave the pulleys freely. Vibration of the ropes is thus almost entirely avoided. In view of the growing interest which is being manifested in rope driving in manufacturing establishments, this particular installation is worthy of note and may be examined with profit by engineers.

Two Colliau cupolas—one of eight and one of 15 tons hourly capacity—are provided, a Root blower, already referred to, supplying the blast. The location of these cupolas, which are placed close together, is clearly shown in Fig. 1. Back of them is a hydraulic elevator for raising stock to the charging floor above; tracks run on to the elevator platform, as shown, so that a car can be readily transferred to it. The charging floor is 14 feet above the molding floor, 48 feet square and consists of iron plates supported by iron girders and columns. Iron is delivered to this floor either by the elevator, or, if desirable, the supply cars are pushed by a locomotive up an inclined track which runs over the sand bins. This brings them on the same level with the charging floor and they can there be unloaded. The fuel for the cupolas is also thus delivered and stored in bins provided for the purpose. Coke, we may here add, is largely used. The elevated track continues to the coal-storage house annexed to the boiler-house, affording a convenient means for distribution. The coal is dumped into the storage vaults through openings in the roof, all labor being dispensed with. The sand-bins are supplied in the same way and track scales at the foot of the trestle carrying the elevated track admit of weighing all the stock before it is unloaded. The sand-bins have a capacity of 1000 tons and their dividing walls are carried up sufficiently high to form supports for the track above.

The core ovens marked C C in the plan, furnished by the Brown & Sharpe Mfg. Company, of Providence, R. I., are unique

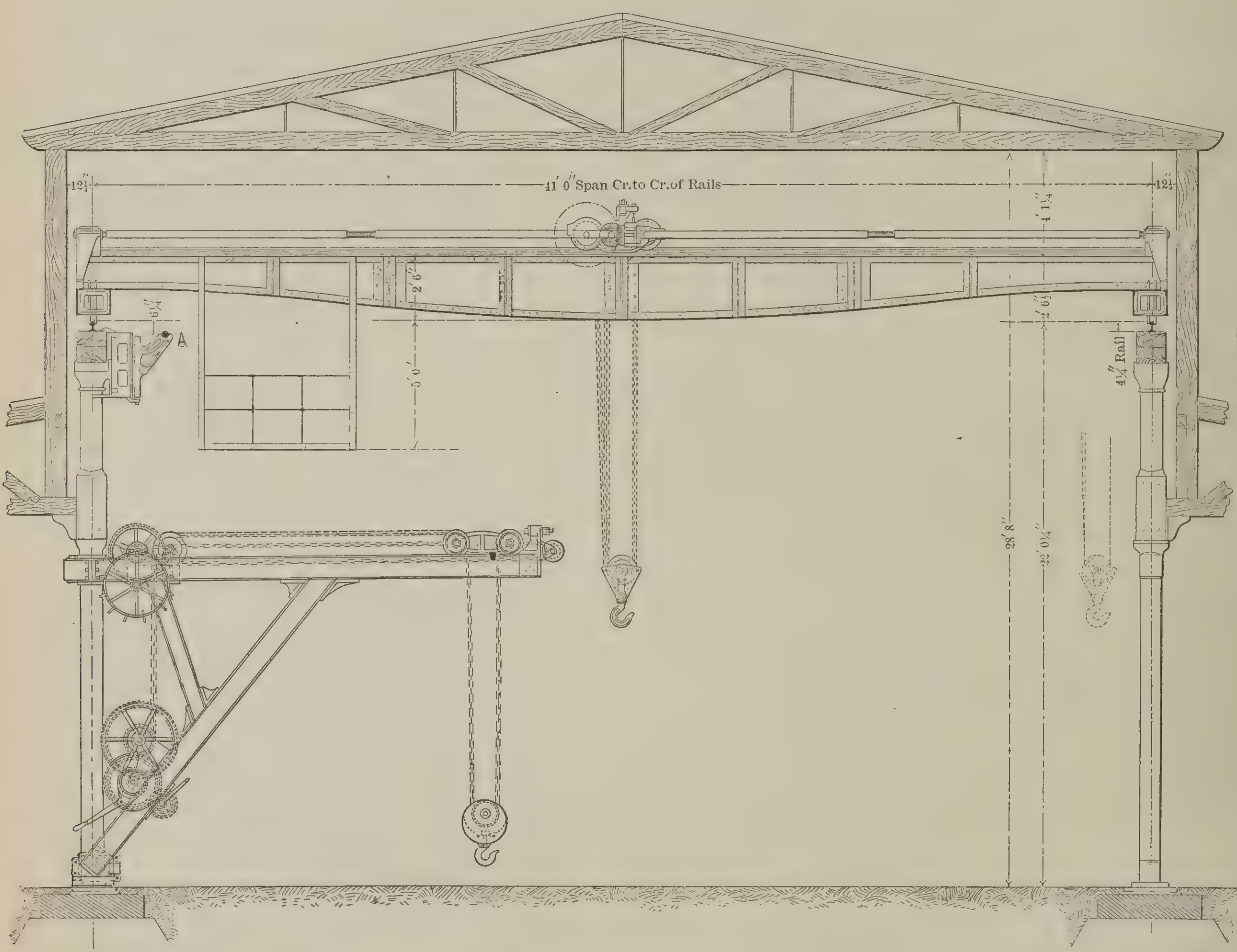
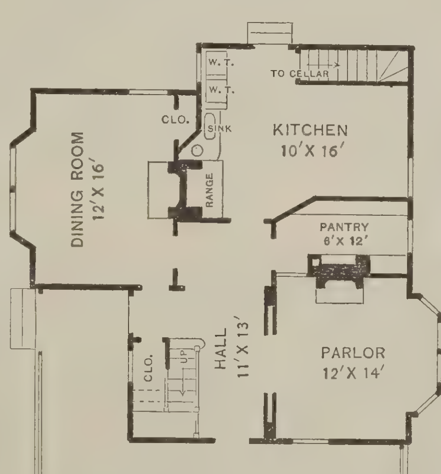


Fig. 4.—Cross Section of Middle Portion of Foundry, Showing Jib and Overhead Traveling Cranes.

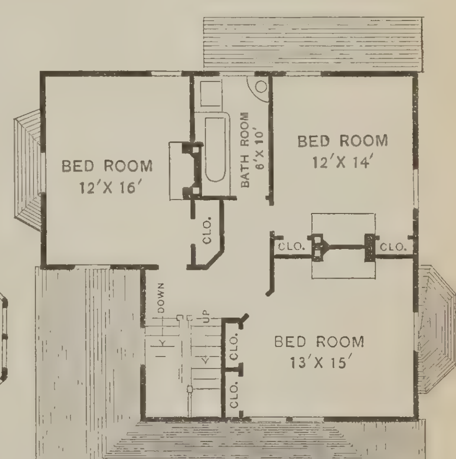
Design for Cottage, by N. Brewer, Jr.—Estimated to Cost $2500. See Description next page.

in arrangement. The bottoms are on a level with the foundry floor, and tracks enter the ovens so that large cores placed on a truck can be run in and baked without handling. The heating is accomplished by traversing flues from a furnace. For small molding work a Tabor molding machine is employed. Both foundry and machine shop are abundantly lighted and ventilated from the roof and the windows in the side walls. The machine shop is 504 feet long and 100 feet wide, and the foundry 240 feet long and 90 feet wide, both being one story high, measuring 45 feet. The pattern storage building extends from the foundry, and has three floors, the two upper ones being provided with shelves for the smaller patterns, while the larger ones are kept below. The last building to which we now come is the blacksmith shop. The architectural features of this structure at once attract attention, the walls being solid only up to a level of 6 feet from the ground. Above this they are made up almost entirely of glass, mounted in pivoted frames. These can be swung to any desired angle and held there. The blast is carried to the building in pipes and can be turned on or off at pleasure. Iron forges are used, and their flues are suitably connected with branches from the blast-pipe so as to thoroughly draw off all smoke and gases. A 700-pound Morgan steam hammer is also provided. From the design adopted it will be understood that an exceptionably clean and well-lighted blacksmith shop has been secured.

A detail of great importance in every establishment is that of fire protection, and in this respect ample provisions have been made at the works. Under the engine-room, in a cellar, are two sets of steam pumps, one of them being used for returning the condensed steam from the heating pipes to the boilers, and the other being for general water service and, at the same time, fire supply, the water being drawn from seven driven wells. This pump is regulated to maintain a constant pressure of 50 pounds per square inch in all the pipes, stopping or starting automatically as the pressure tends to rise or fall. Failure of the pump to act would be noticed at once by the failure of the general water supply, calling for immediate attention, and the pump is thus necessarily kept in a state of constant efficiency.



First-Floor Plan.



Second-Floor Plan.

Floor Plans.—Scale, 1-16 Inch to the Foot.

In case of fire, therefore, everything, so far as the water supply is concerned, is ready for instant action, and by adding to the load on the pump regulator the pressure in the pipes can be increased at a moment's notice to 100 pounds. The pumps were built by H. R. Worthington and the Knowles Steam Pump Works. There are 12 hydrants disposed at various points in the building, and eight outside. Electric communication is maintained between the engine-room and a large number of points throughout the establishment, so that notice of fire can be readily transmitted to the attending engineer. Over 200 fire-buckets are, moreover, distributed through the buildings, and are marked, "For fire purposes only", in addition 288 hand grenades are conveniently fastened in wire frames to every other roof-post, and a large number of Babcock extinguishers are provided. The buildings are of brick and have gravel roofs, and are heated by an overhead steam-pipe system.

$2500 Cottage.

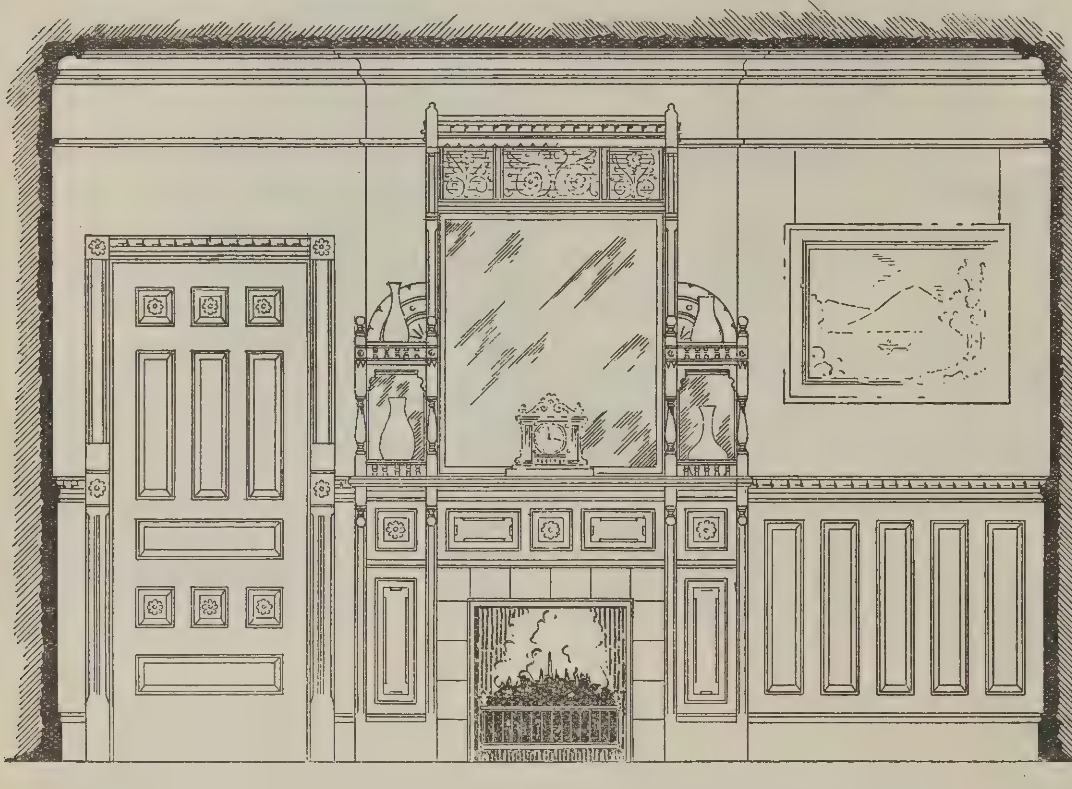
We present on page 167 perspective view and floor plans of a two-story cottage, having provision for attic chambers, designed by N. Brewer, Jr., architect, No. 136 East 29th street, New York, which he estimates to cost about $2500. There are three capacious rooms, together with hall and pantry, provided on the lower floor, and three chambers, together with hall and bathroom on the second floor. A generous-sized piazza extends around the side and front of the building, and a bay-window occurs in both dining-room and parlor. There are various features of arrangement about this building that will commend it to the favorable notice of our readers.

Catalogue of Plumbing Goods.

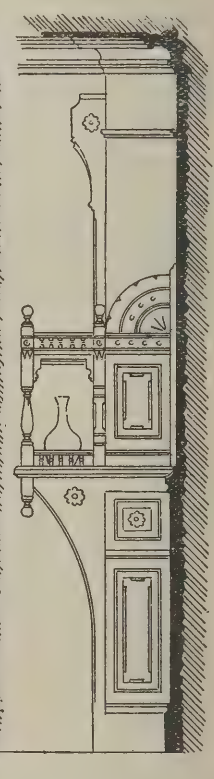
We are indebted to the J. L. Mott Iron Works, 86 Beekman street, New York, for a copy of their 1888 catalogue "G," illustrating the plumbing and sanitary department of their works. We have had occasion in previous years to refer to the high excellence of the trade publications of this company, but we do not remember ever having received such a large and handsome catalogue as the one before us. It is some 11 x 14 inches in size and contains over 270 pages. It is bound in cloth of a slate-gray color, with the title printed in gold. The paper is heavy and of excellent quality and the very great number of illustrations are all carefully executed and well printed. As indicating the extent of the contents of this publication, we would mention that there are over 800 plates, each one of which means a separate illustration. Scattered throughout the book are fine colored lithographic reproductions of porcelain ware, such as water-closets, wash-basins, porcelain tubs, folding urinals, &c. The colored illustrations are on paper of highly calendered surface, which brings out the details in the most effective manner. We specially note the care with which the printing was done, the various colors all being in perfect register. To give any adequate account of the extensive line of goods covered in this catalogue would be impossible in a short notice, and we regret that there is no classification of the articles so that we might at least give the chapter headings. Glancing over the work, the first thing that attracts attention are the various bathrooms and bathtubs of all varieties and designs, and which fill some 50 pages. Next in order there is presented a large line of water-closets, ranging from the expensive porcelain to the plainest form of hopper closets. Following this is a variety of closets, &c., after which come wash-basins set in various ways and illustrating several styles. Slop sinks and sinks of all kinds are next taken up, including washtubs in many different patterns. The remainder of the book is filled with illustrations of urinals, range boilers, valves, cast-iron fittings, leader-pipes, steam kettles, &c. At the close of the book an index is given by which easy reference can be made to the contents, the various articles being classified alphabetically. Accompanying the book is a pamphlet of over 100 pages, which is entirely devoted to a price list of the goods shown in the catalogue. These goods are identified by plate numbers and by the letter G, which denotes this particular trade publication, and the several sizes of the different articles are referred to, besides their different styles of finish. As all the goods are numbered consecutively, it is an easy matter to refer from the catalogue to the price list. We believe that the J. L. Mott Iron Works enjoys the distinction of publishing the finest catalogues in this department of manufacture, and if each succeeding year shows an equal increase in quantity and quality the trade will look for their future publications with a great deal of appreciative interest.

A Study in Inside Finish.

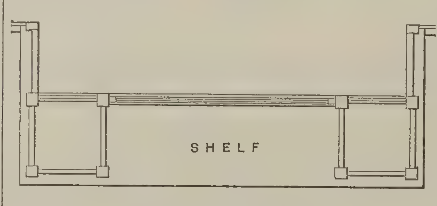
In the elevation, section and plans, together with details presented herewith by Mr. H. P. Miller, of Philadelphia, a designer with whose work many of our readers are already familiar presents a study in interior finish that is of interest. The work may be supposed to be in a dining-room. A cheerful grate fire is shown below a very attractive mantelpiece, a conspicuous feature of which is the large expanse of glass. The side elevation or section shows how the pilasters project, providing shelf room for articles of *bric-à-brac;* it also indicates the returns on the chimney-piece and how the sides are finished by paneling. A section of wainscoting is shown at the right, connecting with the mantel, while the finish and design of the door is shown at the left. The work in many other respects is clearly shown by the details and sections.



A Study in Inside Finish.—Side Elevation of Room Showing Mantel, Door and Wainscoting.



End Elevation of Mantel.



Plan of Shelf.

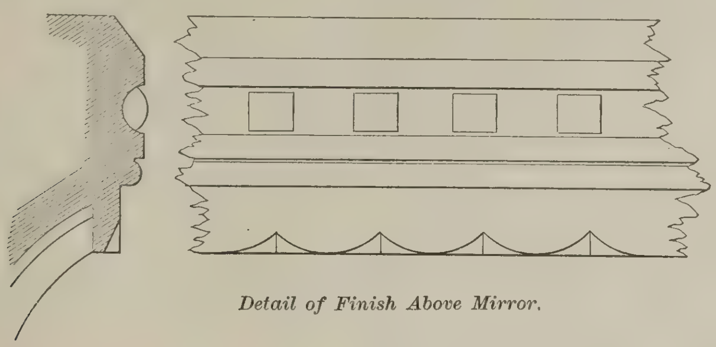
Practical Paper Hanging.

In a recent issue of this journal we presented some directions for paper hanging, taken from the *Painter's Magazine.* We now lay before our readers the substance of another article on the same subject, from the same journal, which is, in effect, a variation in the method already suggested.

The following list comprises a paper hanger's kit: two pairs 14-inch shears; eight sweeping brushes; one paste brush; two smoothing rollers; one can containing plaster-of-paris; one can containing whiting; two trimming knives, with piece of emery cloth to sharpen them upon; one kalsomining brush; one putty knife or small trowel; one complete overdress; one awl, with chalk line and chalk; one hammer for pulling nails: one wall scraper; one rule; one 5-gallon galvanized-iron pail for stock paste; one 3-gallon galvanized-iron pail for thinning down in; one extra pail for water; one 2-gallon pail for size, if needed; two step ladders; one plank of

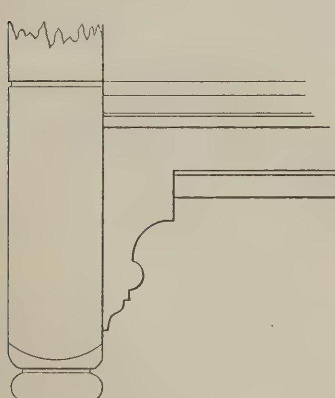
necessary length; one pasteboard, 22 inches wide.

Paste is best made by steam, and put up by the barrel. First put in your pulverized alum and flour, then put in cold water and stir until you have all the lumps out; then if you have time let it stand until next day, when every lump can be broken up; then fill your vessel with cold water, added gradually, meantime stirring your paste. Place the vessel in connection with your steam jet, turn on your steam and let it cook. When it begins to thicken keep up a continual stirring, so as to have it cook evenly. After cooking pour a little cold water over the top of the paste to prevent skinning, until you are ready to use it. No kind of paper can be injured by this paste so long as the paste is kept only on the back of the paper. Alum is added to the paste for two reasons: 1. It keeps the paste from souring a longer time, especially in hot weather. 2. A chemical combination takes place between the solution of the flour and the alum which makes real paste. Paste made without a lime is very difficult to thin down to the proper consistency for hanging a white blank, and then remain in that consistency until it gets cold. Alum paste when dry is harder than any other kind. Paste made with alum will hang 50 per cent. more paper than an equal quantity of paste made without alum.



Detail of Finish Above Mirror.

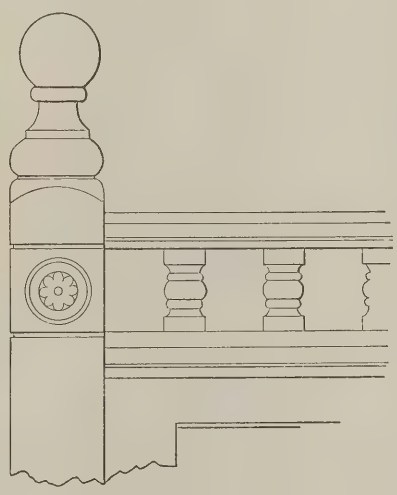
When cutting your paper measure the side wall from the ceiling to the top of the base board, and then cut in the figure nearest the length that will be long enough. This, of course, varies according to whether your paper is a close or long match. The pasting board, which is the invention of Mr. George E. Belt, of Atchison, Kan., is made of $\frac{5}{8}$ poplar and is 10 feet long. The legs and braces are of $\frac{7}{8}$ pine, and are made high enough for convenient working—that is, 32 inches will not weigh above 35 pounds. The board is best made in three parts—that is, a central board 10 inches in width, and two sideboards 6 inches in width, each braced together by cross pieces screwed on. The reason for having the board made in three pieces is that the trimming knife soon makes the outer edge spongy. After the outside pieces become cut up too much, take out the screws and turn them upside down, and you have a good surface again. When both sides are used up remove the brace and replace them with new ones, which will not cost half as much as a new board in one piece of 22 inches. This width of board suits the paper, which is not less than 20 inches wide, leaving 2 inches to do the trimming. Have a good straight-edge and keep your knives sharp, and the trimming is mere fun. In pasting, don't "slog" on the paste, as the paper is apt to burst and crack wide when applied. Lay paste on evenly. The paste for white blanks should be like cream in consistency. For browns a little thinner is best. For satins and micas a little heavier than for white blanks. For bronzes a little heavier than for satins is best. The lighter the paper (in weight) the lighter the paste.



Detail of Finish of Small Side Shelves.

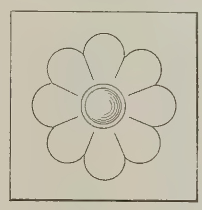
Cleaning Metal and Stonework.

During the year 1886 the masonry and ironwork of the Madrid and Baudin bridges at Paris were thoroughly cleansed by Messrs. Mathieu and Peigné, who work the patent processes of M. Liebhaber. These processes, which are purely chemical in their nature, were at first applied solely to the cleaning of limestones, but in these bridges materials of a very different nature were successfully dealt with. The surfaces to be cleansed, as described in *Engineering*, are submitted to the action of a jet of mixed hydrochloric and sulphuric acids, and left for two or three hours, when they are well brushed, and finally washed down with a water jet, which completes the process. In the case of limestone masonry, the hydrochloric acid unites with the calcium, forming chloride of lime, which is then decomposed by the sulphuric acid forming a calcium sulphate, this being precipitated on the face of the stone, and containing all the impurities, which are then removed by the action of the brush and of the water jet. In many cases this acid treatment will not succeed unless the stone is previously prepared, as the masonry frequently becomes coated with a black and shining deposit of all the impurities contained in the atmosphere of a large town, which entirely prevents the acids reaching the stone.

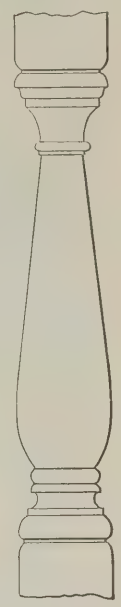


Railing Surrounding Side Shelves.

In this case M. de Liebhaber, before applying the acids, covers the stone with an alkaline paste, consisting of a mixture of carbonate of soda and calcium hydrate, which he has named "tolugene." This paste is spread over the face of the masonry with a trowel, to a thickness of from $\frac{1}{2}$ to 1 mm., and left there for from three-quarters of an hour to an hour, when the excess is quickly washed down and brushed off, and the acids applied as previously described. In cleaning ironwork the "tolugene" alone is used; it is spread over the work either with trowel or brush, and in the course of an hour or so will have united with all the oil of the paint, leaving the red-lead on the work in the form of a dry powder, which can be easily washed off with a jet of water. The metal is said to be cleansed much better than by the older method of burning and scraping off the paint. For cleansing brickwork M. Liebhaber makes use of the property which hydrofluoric acid possesses of separating the silica from silicates. The work is first painted with a solution of ammonium fluoride, and this immediately afterward is treated with a jet of concentrated sulphuric acid, which liberates hydrofluoric acid *in situ*, and this immediately attacks the silicates, robbing them of their silica. The whole surface is afterward thoroughly washed with water. With regard to the cost of the processes, a total of 502 square yards of masonry, of which about 165 were sandstone, were treated at the Madrid Bridge at a cost of from 13 to 17 cents per square yard, and brickwork at the Baudin Bridge cost 17 cents per square yard, the prices including the cost of erection of such scaffolding as was necessary. With regard to the ironwork, the contract price was 20 cents per square yard for plain work, and 31 cents per square yard for molded work, but the contractors are said to have lost money in carrying out this part of their contract.



Rosette.



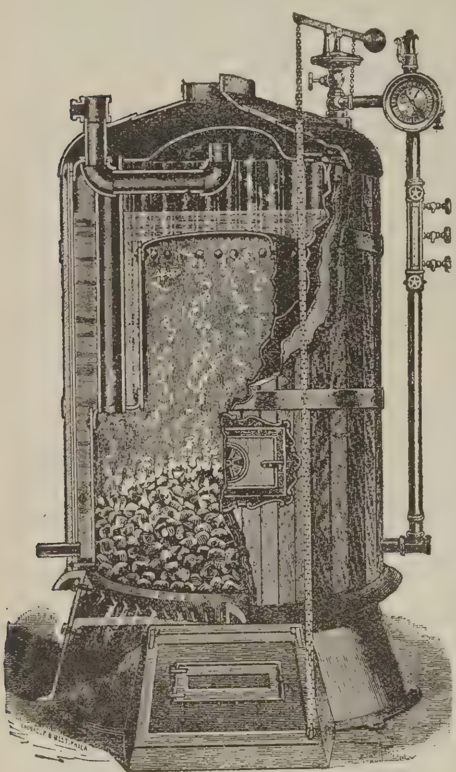
Pilaster.

Workers in Wood.—It may be some time before it is decided, to the satisfaction of either party, who were the most skilled workers in wood, the ancients or the mechanics of more recent date. The following, taken from an exchange, would indicate that there were some of our near relations, so far as date is concerned, who were quite skilled in wood working: "An old lady living at Ryde, Isle of Wight, died recently, and in due course her furniture was advertised for sale. On the day before the sale one of the executors carefully examined an ancient bureau, and discovered a secret drawer and a false bottom, in which were upward of 1000 sovereigns, closely packed together." The heirs were lucky in having careful executors.

STEAM AND HOT-WATER HEATERS.

The Star Steam and Hot-Water Heater.

The Star Steam Heater Company, of Mount Joy, Pa., are introducing a new form of steam and hot water heater which we show in section and elevation on this page.



Star Steam and Hot-Water Heater.—Fig. 1.—Sectional Perspective.

It is built under patents of Mr. H. H. Lindemuth, and is designed specially with a view to economical coal burning.

From the illustration it will be noted that a cylindrical chamber is arranged centrally to receive the rising gas. In this

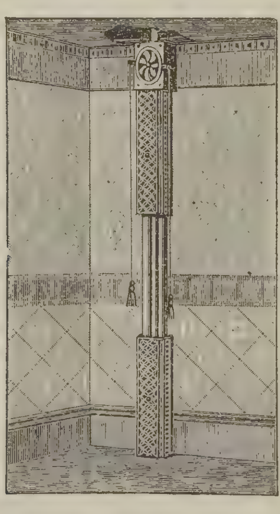


Fig. 2.—Ornamental Pipe Covering and Ventilator.

chamber it is held until, as the builders claim, all the combustible matter is consumed. Other rising gases will drive the remaining incombustible matter down along the sides of the gas chamber, and thence it will escape through the flues to the air chamber above and pass off into the smoke-flue, not in the form of thick volumes of smoke, but in well-utilized products of combustion, only a very small portion having escaped through the flues unconsumed. Either anthracite or bituminous coal may be burned, but the furnace is more especially adapted to bituminous. A number of hand-hole plates in the dome facilitate the cleaning of the tubes. These, moreover, are easily removed. No cast iron enters into the combination of the boiler. As a protection against loss from radiation the latter is first covered with a sheet of asbestos, then comes a covering of wood, another capital non-conductor, made of alternate pieces of walnut and ash, the whole being held in place by three galvanized brass bands. The grate is simple, easy to shake and dump, and can be easily replaced when repairs finally become necessary.

In Fig. 2 we show an ornamental pipe covering and ventilator turned out by the same firm. It consists of sections of ornamental bronzed cast iron placed one above the other, as shown, to shield the exposed pipe. Each section is 12 inches long, and so held in place by a notch in the piece below and a screw in the wall. The upper section consists of a register, which when open acts as a ventilator to draw the vitiated air from the room.

The Crown Hot-Water Boilers.

The accompanying illustrations, Figs. 1 and 2, illustrate in sectional view the Duplex Crown and the Crown hot-water boilers for heating purposes, which are manufactured and put upon the market by N. K.

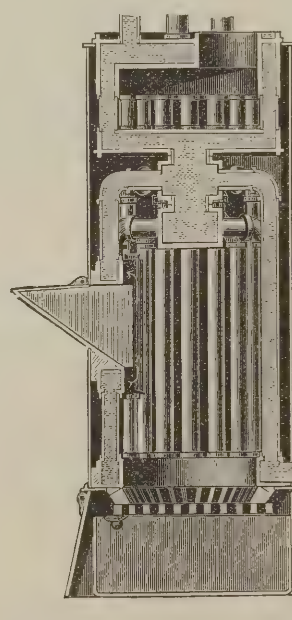


Fig. 1.—Sectional View of the Duplex Crown Hot-Water Boiler.

Aylward, 436 West Court street, Cincinnati, Ohio. Mr. Aylward uses the closed system of circulation, with a pressure of about 2 pounds at tank when the temperature of water is 212° or over. Referring to Fig. 1, which illustrates the Duplex Crown, it will be noticed that the boiler is constructed of heavy cast-iron rings connected with extra heavy steel tubes. It will be further observed that the water returning to the boiler passes first into the bottom ring, then up the steel tubes which surround the fire into the spiders directly over the fire. Then up into the hollow plate, where the water is again spread over the fire, then up again through the steel tubes between which the products of combustion must pass, and finally into the top. From that point the water, heated to 200° or over, leaves the boiler on its passage to the radiators. All the joints in the Duplex Crown boiler are screwed together, and any of the steel tubes surrounding the fire can be taken out without disturbing the others. The light and strong construction of this boiler is contrasted by the manufacturer with the ordinary forms of cast-iron boilers. The Duplex Crown is covered with a heavy wrought-iron jacket, one part of which opens on hinges, giving free access to all parts of the apparatus. The manufacturer alludes to the very large heating surface and states that all the surface above the fire is direct heating surface, the superior efficiency of which is well understood. Turning to Fig. 2, we find a sectional illustration of the Crown hot-water boiler. In this water enters through the pipes A in the bottom ring B, there being four of these inlet-pipes in

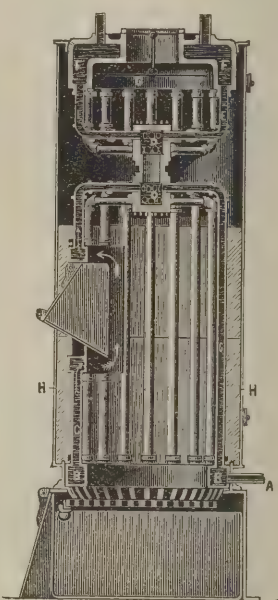
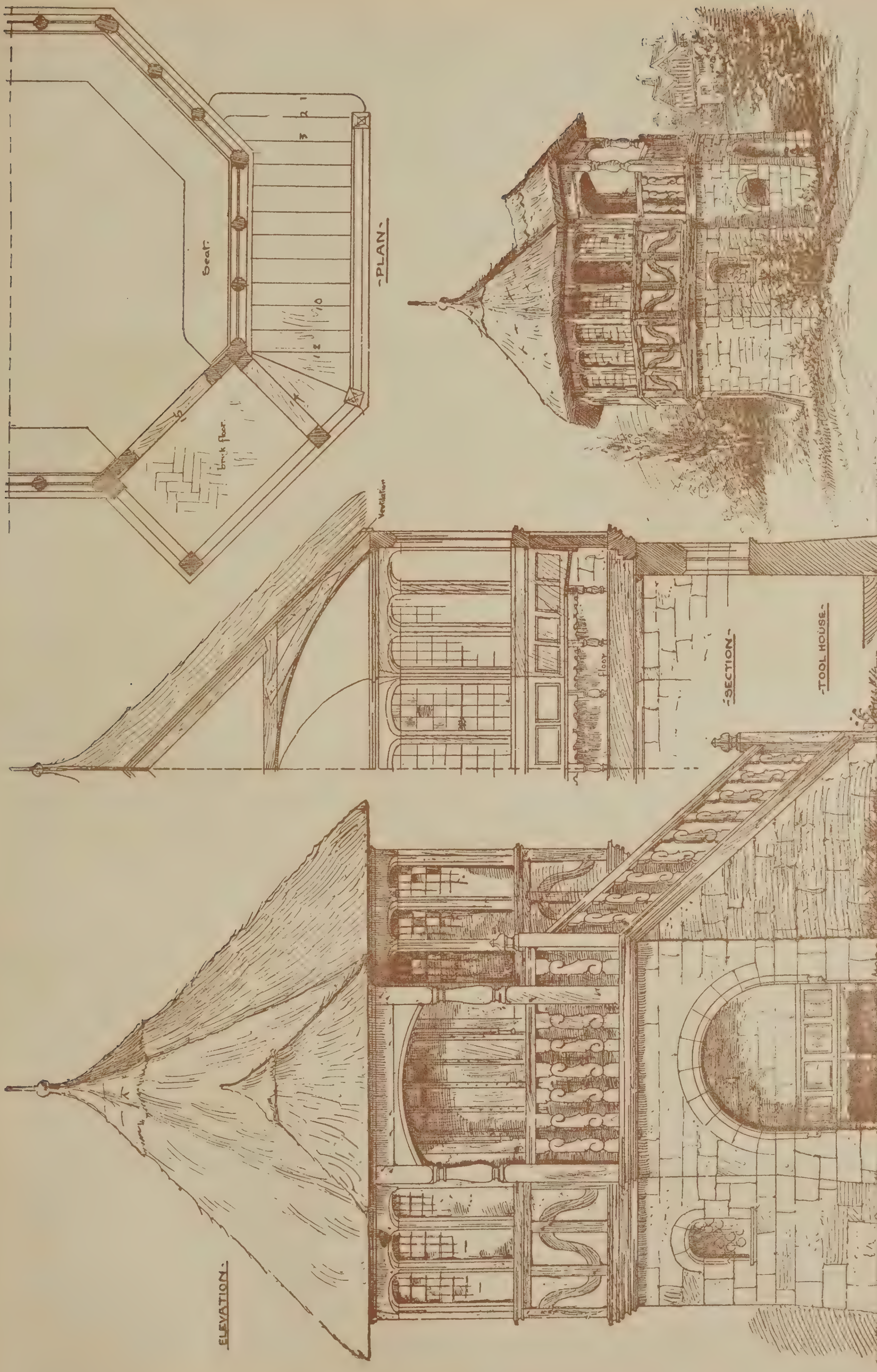


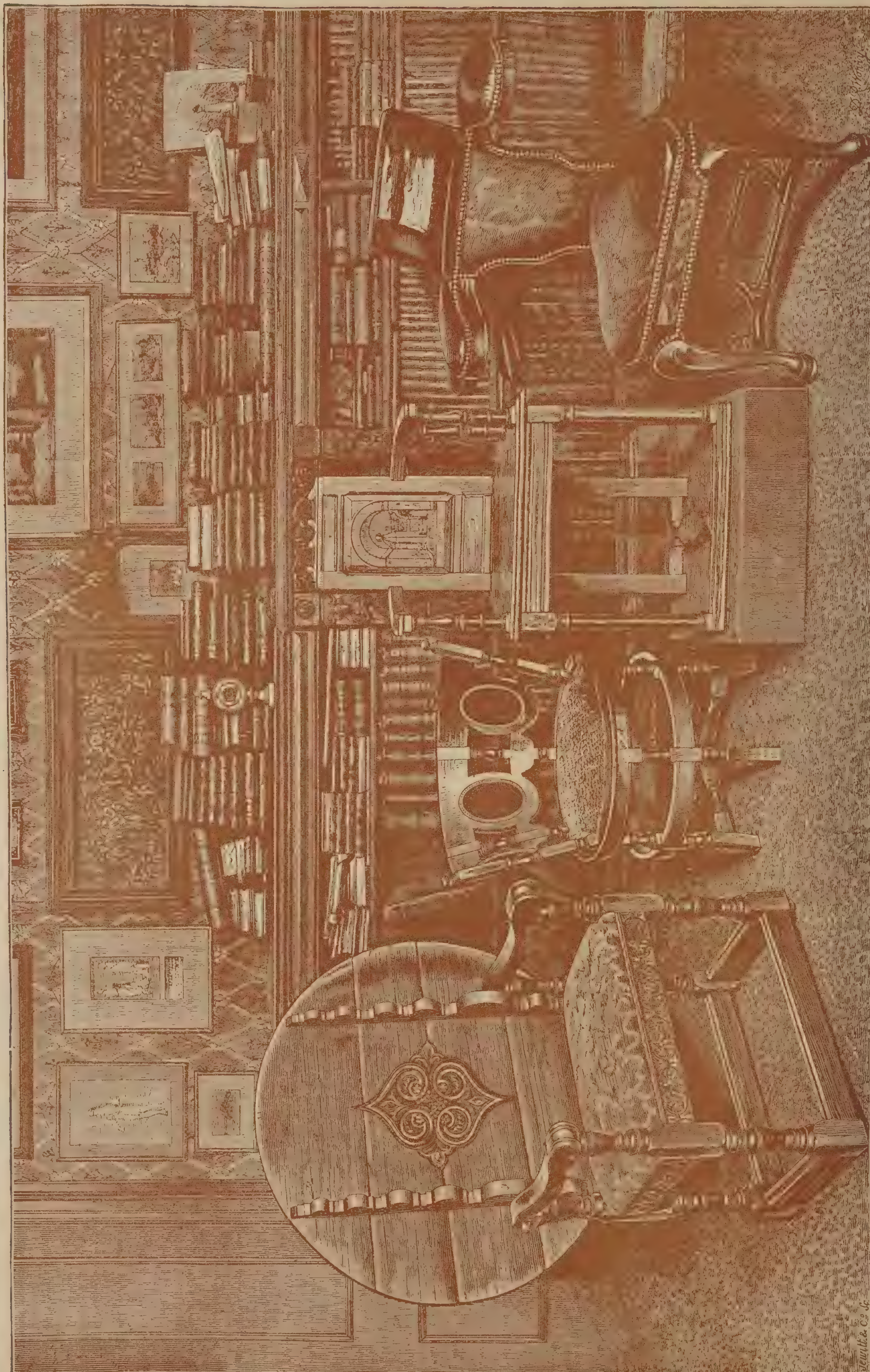
Fig. 2.—Sectional View of the Crown Hot-Water Boiler.

each boiler. From B the water passes up through the steel tubes surrounding the fire into the spiders D D, which with the horizontal pipes from a double crown directly over the fire, and through which all the water must pass. The flame from the fire and heated products of combustion circulate around these pipes. H H is a fire-brick lining surrounding the fire. F is the top, from which four pipes conduct the water to the radiators, and G is a cast-iron plate deflecting the remaining heat against the top F. The No. 2 Crown boiler is adapted to heating 650 square feet of radiators, or 32,000 cubic feet of space. The Duplex Crown boilers Nos. 2 and 3 are made to heat 750 and 1050 square feet of surface respectively. The manufacturer states that these figures are an underestimate, and that if the apparatus is put up in proper manner the capacity will be some 20 per cent. greater.

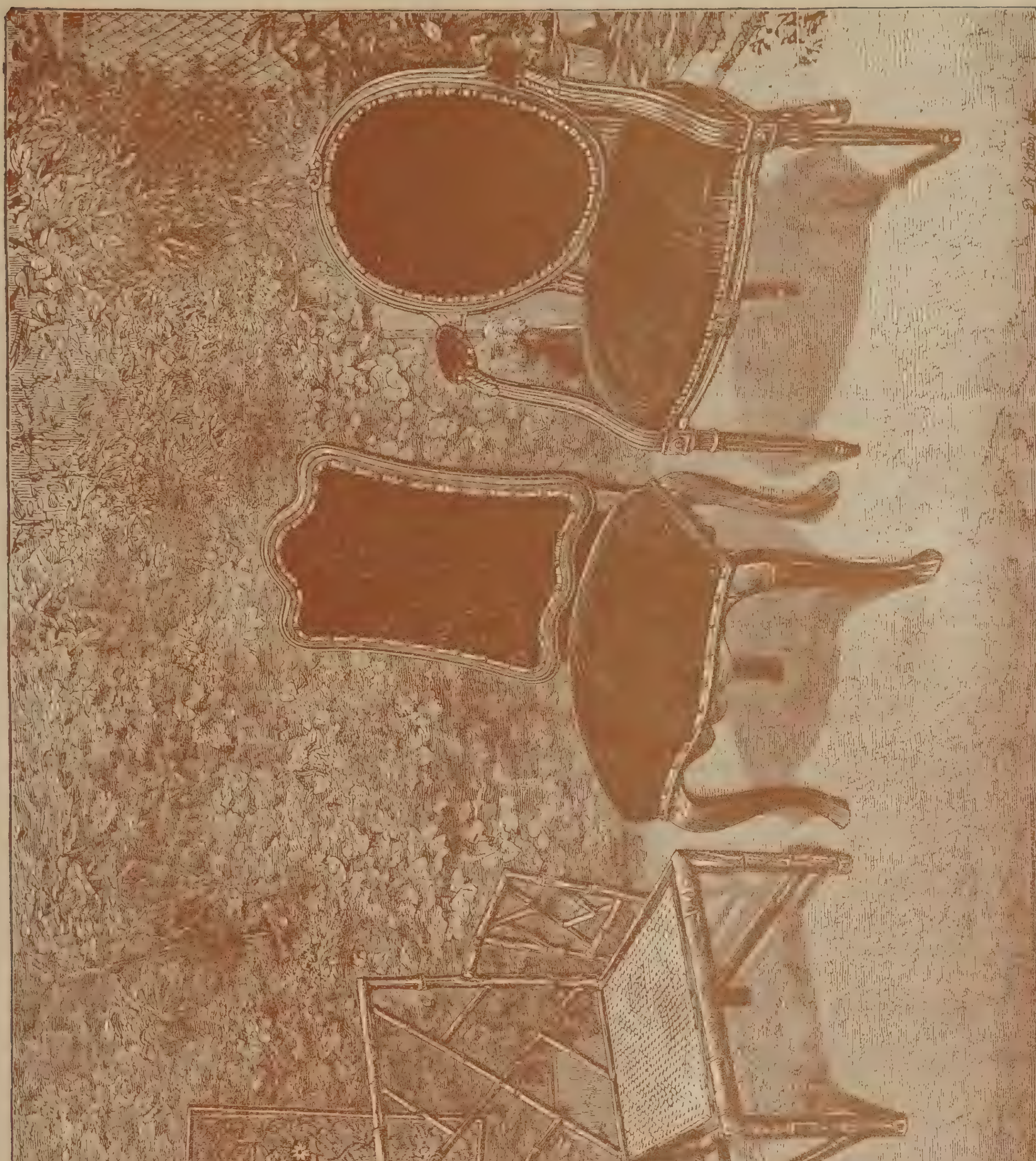
To Hang Paper on Damp Walls.—A mode of hanging paper on damp walls has been patented in Germany. Lining paper, coated on one side with a solution of shellac in spirit, of a somewhat greater consistency than ordinary French polish, is hung with the side thus treated toward the damp wall. The paper-hanging is then performed in the usual manner with paste. Any other description of rosin that is of equal solution in spirit may be used in place of the shellac. According to the representations made of this process, a layer of paper thus saturated with rosin is found equally effectual in preventing the penetration of damp.



Design for Summer House Built above a Tool House.



CHAIRS OF FAMOUS PERSONS—THEODORE HOOK, BULWER LYTTON, SHAKSPERE and GAY.



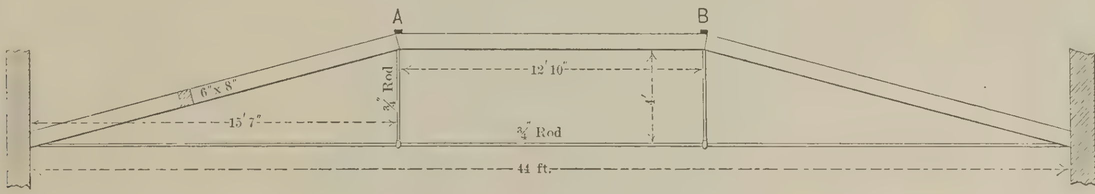
CHAIRS OF FAMOUS PERSONS—ANNA BULLEN, MRS. SIDDONS, LORD BYRON and LADY MORGAN.

WALL PAPER—DESIGNED BY GEORGE G. HAITÉ.

CORRESPONDENCE.

Roof Truss.

From G. W. C., *Junction City, Kan.*—A short time since I was invited by the owners to examine a hall which had just been finished and which, by the way, was a very nice hall, well lighted, thoroughly ventilated and provided with commodious means of access and egress. The plastering was done in a way to reveal the framework of the trusses. After looking about and taking in all that I could, I casually and inadvertly remarked that the truss that they had employed was not a very strong one and that accordingly the plastering would be more likely to crack than would be the case if a rigid truss had been employed. Well, now, my brother woodbutchers, in that little remark I made what appeared to be a very large mistake. The designer was a brick mason and a stone mason, and in those trades is an excellent mechanic, consequently he ought to know all about trusses, don't you see? I don't object to that, but the owner said that he learned all about such things before I was born. Inasmuch as I am 50 and he is 40 there was a question of dates that might have been argued. However, I passed that by, but he accused me of jealousy, simply because I criticised the work with which I had nothing to do. Now, fellow readers of *Carpentry and Building*, civil engineers included, I desire to say that my object in this rigamarole is simply to present the question, is a truss 44 feet span with a 4-foot rise to a 15-foot 7 inch run, and a deck 12 feet, 10 inches wide a strong one, being arranged as shown in the diagram? It seems to me that a little extra weight at the point A, would naturally elevate the point B.



Truss Design.—Submitted by G. W. C.

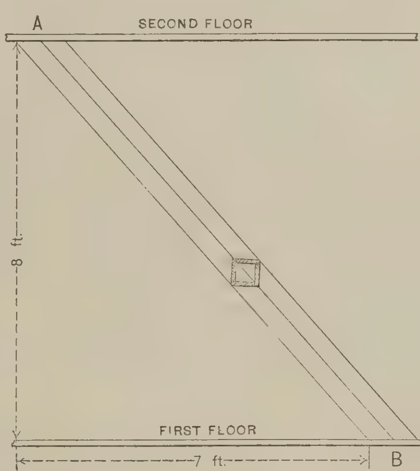
Attaching a Gutter to a Flat Tin Roof.

From A. B. PHINNEY, *Glasco, Kan.*—I send you by this mail a model showing my method of putting on a gutter to a flat tin roof. I have put up gutters in this way for several years past and I find the method very satisfactory. The hanger I make of the straps that inclose bundles of galvanized iron. These are 1 inch wide by ⅛ inch thick. I advise that the hangers be put not over 3 feet apart. The strip of wood on the model represents a 2 x 8 piece of timber, with which the roof is finished on the lower edge. This timber should be as deep as 8 inches for a 24-foot building, in order to get enough fall. I am not pleased with the idea of nailing the gutter fast, nor do I like the idea of turning the tin from the roof down low enough to be lapped on to the gutter, so I put in a piece between the two, as shown in the model. This laps over the gutter and turns out at the top. The roof tin may be hooked over this and hammered down, which covers all the nail-heads. Instead of nailing the back edge of the gutter to keep it down snug I simply push it down and drive a small wire in place, bending it over at the top, thus binding it in place. I think this method may be of interest to many of your readers.

Note.—The model which our correspondent incloses us is a neat specimen of workmanship and very satisfactorily displays the mechanical features which he has described above. The strips forming braces for supporting the gutter are shown screwed to the 2 x 8 piece of timber which he refers to above. They extend down around the gutter and incase the bead in front by means of an additional piece of metal of lighter gauge and more easily bent. The back of the gutter is held in place against the timber referred to by what may be termed as half of double-pointed tacks. In other words, the wire is a cleat which holds the gutter in place, while at the same time leaving the edge abundant opportunity for movement from whatever cause desired. The strip which he employs to connect between the roof and the gutter laps over the gutter at the bottom, while the upper edge is bent outward, so that the roof tin turning over hooks against it in a way to seam down. The central idea in this construction would seem to be to have no projection to the eaves of the roof, but, instead, to have the work finish close.

Constructing a Grain Spout.

From J. H. D., *New Point, Ind.*—Will some practical reader of *Carpentry and Building* tell me how to get the bevels for a grain spout, as indicated in the diagram



Problem in Bevels.—Submitted by J. H. D.

I inclose? I would like to know how to find the bevels at A and B—that is, the bevels to fit against the second floor and also down against the first floor. The section shows how the spout would be placed. It is square, but set diagonally with the room. Is there a rule for cutting these bevels?

Note.—The problem which our correspondent presents is not a difficult one to many of our readers, and it is not essentially different from other problems which they have discussed in our colums in the past. It comes up, however, in a little different shape from anything we have before presented, and we think a discussion of it may be profitable, and we therefore refer it to our readers as he has suggested.

Pressure Required for Water.

From S. B. R., *New Brunswick, N. J.*—I wish to get some information, through the columns of *Carpentry and Building*, on the pressure required to throw a stream of water. There is a tank to be built, from which will run a main pipe, and a garden hose will lead from the pipe. To throw a stream of water at least 20 feet horizontally, how high should the tank be elevated to get the necessary pressure? The main pipe is 1½ inches in diameter, the hose ¾ inch and the nozzle ¼ inch in diameter.

Answer.—Our correspondent has asked a question that is quite difficult to answer, and while a result might be calculated we doubt very much whether such figures would be even approximately correct. The only reliable data are obtained from practical experiments. Tables of this sort have been published by Mr. George A. Ellis, having special reference to the power required for fire streams. Unfortunately, the smallest nozzle referred to is 1 inch in diameter; so his figures will only be a rough guide in the case mentioned by our correspondent. According to the table 10 pounds pressure will throw a stream through a 1-inch nozzle 49 feet horizontally or 22 feet vertically. With a stream so small as ¼ inch diameter the resistance of the air will, of course, be a very much greater factor, relatively; but we should think that 15 pounds pressure would be amply sufficient. To obtain 15 pounds pressure the tank would have to be elevated about 33 feet. If our correspondent has any means of making a practical test, for instance, by attaching a ¼-inch nozzle with a rubber pipe to a faucet in a house, the pressure of water being known, we would advise him to make the experiment, for the information he will thus gain will be more reliable than any approximate deduction we can make from the tables above mentioned.

Bricking a Cistern.

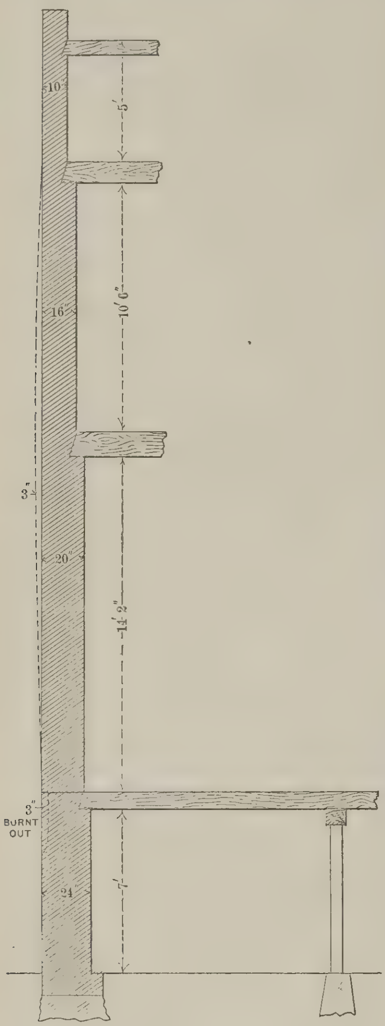
From W. J., *Pattonville, Mo.*—What material should the brick in the walls of a cistern be laid in? Is it best to lay them dry and then cover the inside with cement? I know of several cistern builders who follow the above plan, and others who contend it is best to lay the brick in a composition of lime, sand and cement. My idea is, that the brick should be laid in cement, using two parts of sand to one of cement. I think a discussion of this subject by the practical readers of *Carpentry and Building* would be of great interest and benefit to many readers.

Note.—The above inquiry was referred to a mason of great experience in building various kinds of similar work, and his advice was to lay the brick in the same composition that our correspondent recommends, only that the brick should be laid with open (inside) joints, so that the final inside coat should have a good hold. This final coat should be put on at least ¾ inch thick, and in one coat only. The cement lining, when done, should be kept sprinkled enough to keep it moist, and permitted to stand at least one week before allowing water to be admitted. Another idea advanced was, that the bottom of the cistern should be made of concrete, care being taken to have it strong enough to withstand the great pressure that it would naturally have to sustain. Just how thick this bottom would have to be would depend, to a great extent, upon the kind of

soil the bottom was to rest upon. Our informant further remarked that lime should never be mixed with cement.

Brick Wall.

From F. W. P., *Ellenwood, Kan.*—Inclosed I hand you a sketch of a brick wall of which I would like the opinions of the



Brick Wall.—Referred to by F. W. P.

practical readers of *Carpentry and Building.* The wall in question is the side wall of a corner building, the building being 90 feet long and of the hight indicated in the drawing. The building is occupied as a dry goods and grocery store. It was put up some eight years since, with the defect, I think, of having foundation walls not strong enough for the purpose. They are of brown sandstone. The south side settled about two inches before the building was finished, the front of the building having a better foundation, together with iron columns, did not settle. This caused the front over the lintel course to crack apart. After a fire, which occurred some time since, had destroyed the rest of the buildings in the block in question, it was to be seen that the building was bulged out as indicated in my sketch. I wish to add that it was also visible prior to the fire that the wall was not plumb. The bulging varied from 3 inches near the front of the building to 1 inch in the rear. Furthermore, the outside of the foundation or cellar wall was burned out to some extent, so that the brick projected over the foundation some 3 inches. The owner of the building bought the adjoining south lot, 25 feet front, and proposes to put up another building the same hight as the old one. One object in view is to make the old building safe. He proposes to put up another wall from the ground on the side of the old building, believing this will make it safe. I think, however, that this is not a good idea, as the floor in the old building is $2\frac{1}{2}$ to 3 inches lower on the south side of the building than on the north, and, inasmuch as the building is bulged out the situation is that the whole pressure of the building is toward the south side. It seems to me if the old foundation were to be taken out, part by part, and replaced with a good, strong, new foundation, projecting on both sides 6 inches or so beyond the brick wall, then using the old brick wall for a party wall, for I think the brick wall itself is strong enough, and connect both buildings together thoroughly, a better job would be produced not only in point of strength, but also in securing additional room and in producing a better looking front. The question that arises, therefore, is which is the best way to do this work, as a new wall will always settle a little, and what is wanted in this case is to prevent settling. I should add that if the work is done it must be accomplished while the owner is still doing business in the store in the old building. I shall be glad to have the practical readers in *Carpentry and Building* discuss this problem and give their opinions *in extenso.*

Laying off an Octagon Bay-Window

From W. S. W., *Newton, Kan.*—Having noticed in a back number the question proposed by some correspondent how to lay off an octagon bay-window, I have thought I would send you a method that may be applicable in the case in point. I will first describe a plan for laying off three sides of an octagon from a straight line. Referring to Fig. 1, set off on the line D A the length desired for one side of the window, as indicated from A to B. Then from B to C make the length $\frac{5}{12}$ of A B. The length C D is to be the same as A B. Now, with the foot of the compasses in D, and with radius D C, strike an arc as shown. Then, with the same radius from A as center, strike the second arc indicated. With the dividers set to the same distances and with C as center, strike an arc, cutting the arc struck from A, thus establishing the point B; then in the same way, using B as center, strike an arc cutting the opposite arc, establishing the point E. Draw the lines D E, E F and F A, the result will be three equal lengths and three equal angles. To find the center of the octagon, draw lines through the points F B and E C until they intersect in the point G; then G will be the center as required. The lines F B and

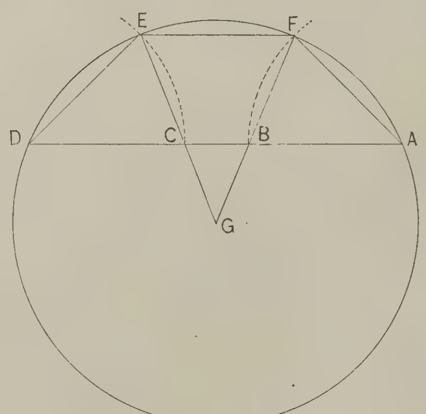


Fig. 1.—Laying off Three Sides of an Octagon in a Straight Line.

E C will be the seats of hips, if any are desired. To lay off an octagon end of a building, as is often done, divide the width of the building into 29 parts, and take 12 parts for each of the extreme spaces and 5 parts for the mean space, and proceed as above. If we wish to make the front side wider than the other sides—for example, 2 feet wider—deduct 2 feet from the width of the building, divide the remaining space into 29 parts, take 12 parts each for the extremes and 5 parts plus 2 feet cut off for the mean space, and proceed as above, save that in crossing the arc at E we must set the compasses 5 parts from C, or at I, all as shown in Fig. 2.

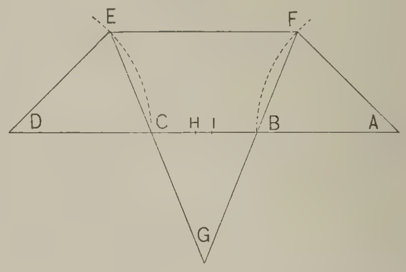


Fig. 2.—Laying off an Octagon End for a Building.

And in crossing at F we set 5 parts from B, or in the point H, as shown. Then we have the front side 2 feet longer than the others, and the angles the same. Three sides of any figure composed of more than four sides can be produced in the same general manner. However, the ratio between the mean part and the extremes will be different. Thus, in a figure of seven sides the mean part will be one-fourth of the extremes. Whatever the mean part is, the sides will be equal and the angles at E and F will be the same.

Adequate Estimates.

From H. M., *St. Louis, Mo.*—Referring to the article by Mr. C. Powell-Karr, in the May issue of *Carpentry and Building,* which I have read with great interest, I would suggest that the next step in the direction of obtaining accurate and adequate estimates is to have the architects' and builders' associations interested in the movement. I suggest that a blank circular be prepared and sent to each member, with spaces to be filled. For example, having established the kind of buildings and the number of rooms, the second item would be the material used; the third, the price of the building; fourth, prices per square foot; fifth, prices per cubic foot, and sixth, the amount spent for ornamentation of front. Still other points might be picked out and answered. Such question-sheets might be taken up in yearly or quarterly lots and therefrom would be worked out an average estimate on various kinds of buildings. This would be very useful, I think, to architects for the purpose of obtaining approximate estimates for proposed similar buildings. Of course a bill of materials would seem to be the most reliable estimate.

Note.—We think our correspondent's suggestions contain the germ of a plan that might be worked out to the advantage of the trade at large by both architects and builders. We have not much faith, however, in the idea of estimates per square foot or per cubic foot. We recognize the fact that such estimates could serve a useful purpose if the classification of buildings could be reduced to such a science as to make mistakes impossible. This, we think, is out of the question at the present time. Given the design and the same specification, the cost of the building, by reason of the way in which it is put up and the kind of materials used, will differ greatly in the hands of different builders in the same locality, and more especially in different localities. What we mean to say is, that the foundation of such a table as

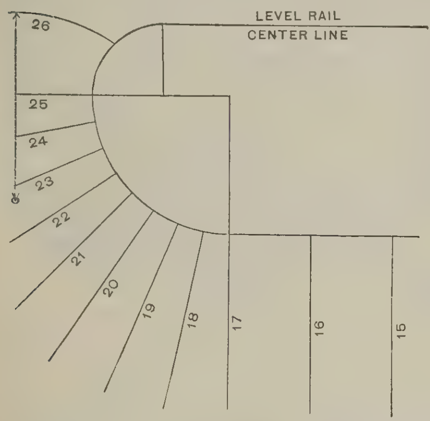
this correspondent suggests would necessitate an accurate classification of buildings, and this, we think, is not possible at the present time. We shall be glad to have our readers consider this subject.

House Plans.

From S. W., *Norwalk, Ohio.*—If any architect or builder in the United States can supply plans to correspond to the sum of money laid down by "J. T. D.," of Lockport, N. Y., in the April number of *Carpentry and Building*, he will confer a very great favor on thousands by publishing the same. With a practical experience of 25 years in the building business, I am prepared to say that it cannot be done in the State of Ohio. Further than this deponent saith not.

Problem in Hand Railing.

From J. H., *London, Eng.*—I shall be glad to see discussed in *Carpentry and Building* the inclosed problem in hand



Problem in Hand Railing.—Submitted by J. H.

railing. The points I should like to see developed are the best way to treat the plane under the following conditions: The hight of risers is 7 inches; the width of tread is 10 inches. The hand rail, which is of mahogany, is to be $4\frac{1}{2}$ inches wide by 3 inches thick. There are five planks on hand for the job. The level of the rail on the landing is to be 3 feet to the top from the floor and the rail on the flyers is to be 2 feet 8 inches to the top, measuring plumb above the face of the risers. The balusters are 2 x 2 inches, turned, one on each winder. The balusters on the winders Nos. 19, 20, 21, 23 and 24 are to be the same length as the short balusters on the flyers. Where are the best positions for the joints, so as to produce the rail under the above conditions?

Supporting Ceiling Joists.

From C. K. P., *Madison, Ohio.*—I am going to do a job of work in July or August, in which a peculiar difficulty arises. I am required to move the partitions that now stand between the parlor and hall of a certain dwelling, making the space into one room. The joists of the second floor are supported by this partition, being in two pieces. The question is, How can I support the ceiling after the partition is removed? I would like to see this answered in the Correspondence department.

Note.—Our practical readers are requested to give this attention. Without anticipating what they are likely to say, we would suggest that if the ceiling is high enough, and the space is not too great, a truss could be thrown across the space formerly occupied by the partition, making the hall space of the enlarged room into the form of an alcove. This plan is objectionable for several reasons. It is possible, however, that the conditions on the floor above are such that the truss could be put there, either in a partition or adjacent to a partition, thus carrying the floor and ceiling from above. We hope our readers will respond to this correspondent's request.

A Wooden House Made of Brick.

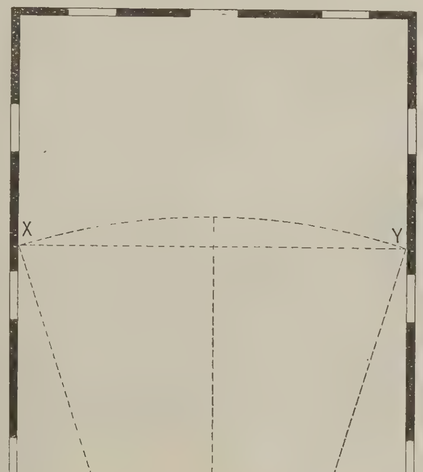
From Jack Plane, *Chicago.*—Some years ago an architect in this city built a wooden house. In time, as his family and the fire limits extended, as it were, an addition was required to the house. The law prevented him from making the addition from wood, and his taste prohibited brick. So a mason was asked if he could make a wooden house from brick. The answer being favorable, the mason was told to go ahead. The walls were made in the usual manner, only the joints between the brick were left open. Then a heavy coat of cement was put on, and the imitation of clapboards made in the same manner that the ornamental moldings about the corners of rooms are made. Every molding that there was about the wooden house was duplicated in cement, save the cornice, which could be easily made of galvanized iron. When the old house and the new addition were painted no one would ever suspect but that the whole was of wood.

Plan of Cottage.

From E. M. K., *Merrill, Wis.*—I have an idea of a cottage that I would like to see worked out in *Carpentry and Building* if some of the contributors to the paper are so disposed. I would be glad to have floor plans and elevations both presented. My idea may be described as follows: The house is to be one and a half stories in hight, Gothic in its general style, with ample veranda room. The first floor is to contain kitchen, dining-room, parlor and pantry, with bath; the second floor is to have three or four sleeping-rooms. I would have the bath connected with both kitchen and pantry, and on the first floor. All necessary closets, clothes-press, &c., should be included.

To Describe Arc of Circle of Large Diameter.

From M. A., *Whitney's Point, N. Y.*—Can a part of the circumference of the



To Describe Arc of Circle of Large Diameter.—Fig. 1.—Plan of Building.

circle be struck in the following manner without going outside of the walls of the building to get a center? I inclose a sketch which will perhaps explain more definitely what I mean. The man I am working for says he can strike any circle and put it inside of a building. I would like to see such a plan demonstrated, as we have a case in which it may be applied at present.

Answer.—In Fig. 1 we have reproduced the sketch furnished by our correspondent. The walls of the building are shown in heavy lines and the dotted arc X Y is the one to be struck. As will be seen from the dotted radial lines, the center is at a considerable distance without the building. There is a plan by which the arc of

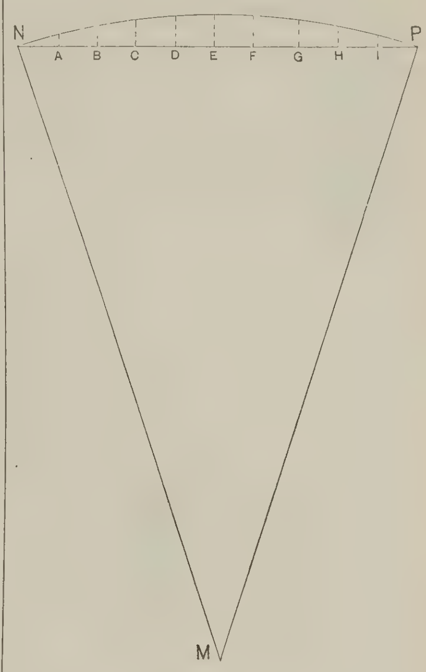


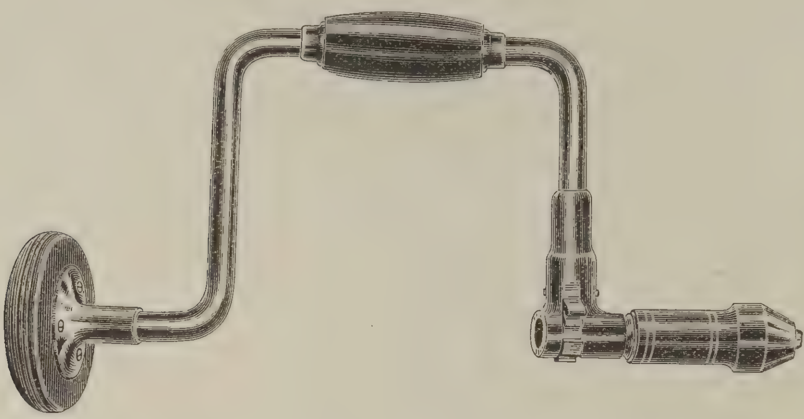
Fig. 2.—Diagram Showing Method of Describing Arc.

a large circle can be drawn on a drawing board without using a center. The method, as perhaps our correspondent is aware, is simply to drive pins in at the extremity of the arc and then put the vertex of a very obtuse angle between them. Now, by holding a pencil at the vertex of this angle and swinging it around, taking care to keep the sides in contact with the pins, a more or less flat arc will be described. The rise of the arc will depend upon the acuteness of the angle. This plan, however, is not practicable in the case which our correspondent cites, neither do we think it feasible to lay off the arc in the manner of a railroad curve, which is done by means of a transit instrument and tangents. The most practical plan that occurs to us at present is to draw the arc to a reduced scale, say $\frac{1}{8}$ inch to the foot, or any convenient ratio. The diagram, Fig. 2, will illustrate the plan. With a radius, M N, equal to, say, $\frac{1}{96}$ part of the larger radius, describe the arc N P; the cord N P also being $\frac{1}{96}$ part of the cord X Y, Fig. 1. Now, dividing the cord up into a number of equal parts, we can measure the ordinates A, B, C, D, &c. Multiplying the length of these cords by the scale of reduction and laying them off vertically at equal distances along the cord X Y, we can get any number of points in the arc X Y. Having marked these points, it will be well to drive nails in them, and then, by means of a thin board bent around the nails, it will be an easy matter to draw the arc with a piece of chalk. We think our correspondent will understand this method without further explanation. There are still other methods, but this seems to be as applicable to the case in point as any that occurs to us at present.

NOVELTIES.

A New Brace.

Amidon & Bastedo, Buffalo, N. Y., for whom John H. Graham & Co., 113



Novelties —Fig. 1.—Amidon's 2d Improved Barber Brace.

Chambers street, New York, are agents, are putting on the market Amidon's 2d Improved Barber Brace, which with their

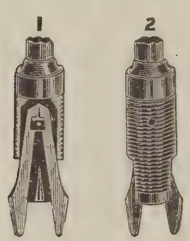


Fig 2.—Socket and Jaws.

Eclipse Ratchet Attachment is represented in Fig. 1 of the illustrations. It is also made plain without ratchet. In this brace the socket is closed half way, as shown in Fig. 2, with a view to preventing the spreading of the jaws, and the pin is placed through the jaws so that they will not fall out when the sleeve is taken off. The location of this pin and its operation are indicated in Fig. 2. Attention is also called to the fact that the sleeve is made especially heavy, so that it will not split open by the pressure of the jaws. Two sizes of socket are made. The ratchet mechanism is represented in Fig. 3. These braces, which are made with 8, 10, 12 and 14-inch sweep, are finished in full nickel plate.

Improved Sash-Clamping Machine.

The engraving which we present, Fig. 4, represents an improved sash-clamping machine, built by the H. B. Smith Machine Company, of Smithville, N. J.,

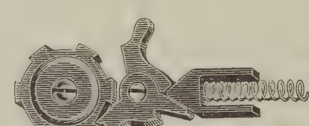


Fig. 3.—Ratchet.

and embodying all the late features of such machines. The framing is of cast iron, while some of the other parts are steel. There are two draft bars instead of one, as other similar machines have, which insures an even pressure on all four corners of the sash, making good square work, with no side or lateral strain. The four triangular corner bars are mounted on traversing plates, each pair of which are united by a right and left screw, and the whole mounted on strong bars surmounting the frame of the machine. The front bar has a lateral adjustment for bringing the four corner bars to a perfect square. When once squared they always remain so for any size. The machine is quickly adjusted for any size of sash from 48 x 60 inches down to 12 inches square. Odd sizes of sash can be rapidly clamped, as little time is used in changing. The swing-ratchet, for retaining the foot lever

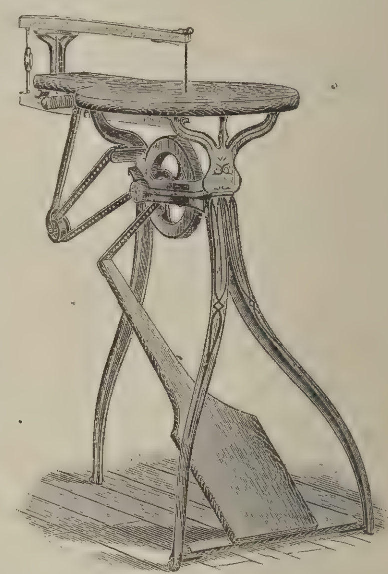


Fig. 5.—Barnes' No. 7 Foot-Power Scroll Saw.

when work is clamped, is a most convenient and reliable device. The machine complete weighs about 860 pounds.

Foot-Power Scroll Saw.

The W. F. & John Barnes Company, No. 71 Ruby street, Rockford, Ill., are directing attention to recent improvements which they have made in what they call their No. 7 Foot-Power Scroll Saw. While the general appearance of the machine, Fig. 5, is not materially changed, the patent perforated belt, of which the company make a specialty, has been added, taking the place of other devices not so satisfactory for use. This belt, the company

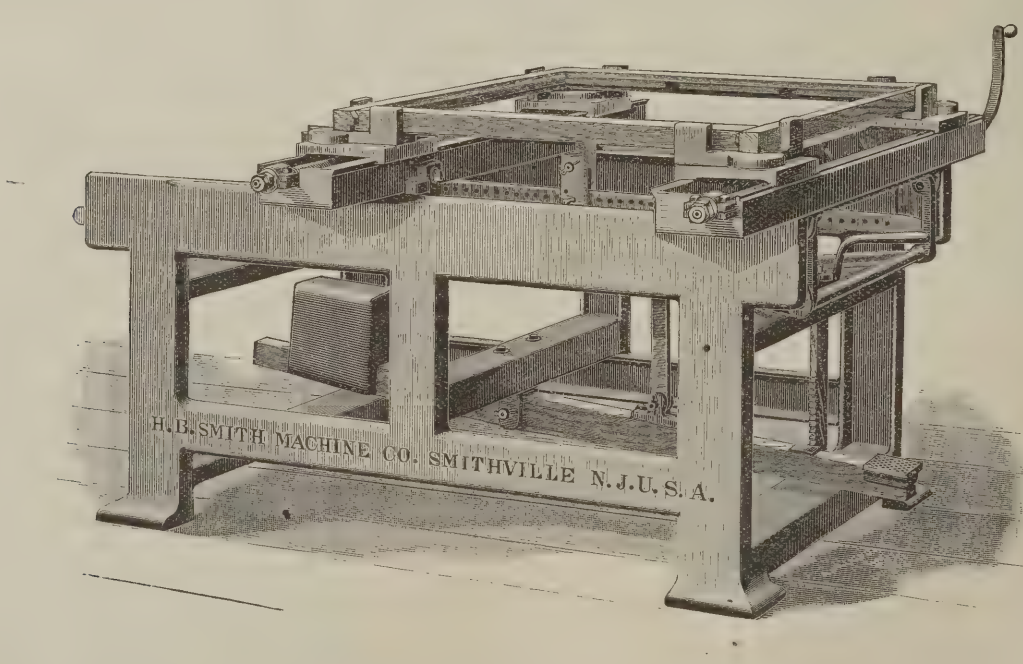
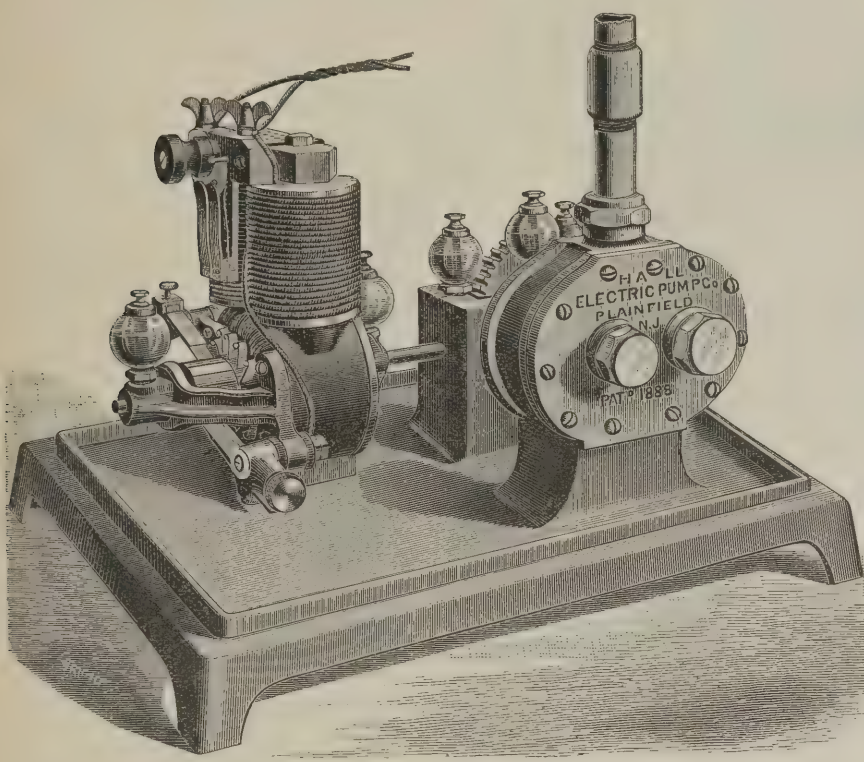


Fig. 4.—Improved Sash-Clamping Machine, Built by the H. B. Smith Machine Co., Smithville, N. J.

inform us, has the great advantage of driving positively, and yet running so slack over the pulleys that there is very little friction in the transmission of the foot-power. The arrangement of the working parts of the improved machine is simpli-



Novelties.—Fig. 6.—Electric Pump, Built by the Hall Electric Pump Co., Plainfield, N. J.

fied, and a less number of parts is used. The company claim that the profit on running one of these machines on ordinary scrollwork at usual rates will pay for the machine in a very short time. Many of our readers will be interested in sending for the circular describing this machine.

The Hall Electric Pump.

The Hall Electric Pump Company, of Plainfield, N. J., with New York offices in the *Tribune* Building, have just made an interesting application of electricity to pumping for domestic water supply. The result is the Hall Electric Pump, of which we annex an engraving, and which is simply a combination of a rotary pump and an electric motor, the power being transmitted from the motor to the pump by a worm gear.

The illustration, Fig. 6, shows a motor of $\frac{1}{8}$ horse-power. The worm on the motor shaft is of steel and runs in a box of oil; the pinion attached to the pump shaft is of best bronze; the pump, of the most improved rotary principle, is also of bronze; the bed plate is of iron. Self-feeding oil cups, each containing one or more week's supply of oil according to the work required, keep all bearings lubricated, and when the pump is at rest no oil escapes. The floor space required is 15 inches by 16 inches, and the hight of the pump is 12 inches. A neat hardwood case keeps out all dust or dirt and prevents meddling with the motor. The electricity must be taken from a dynamo, and either an arc or an incandescent circuit can be used, but the latter is always preferable on account of its safety. In the tank a snap electric switch regulates the supply of water. A common ball float attached to the switch closes or cuts the circuit as water is drawn off, or is returned to the tank.

The action of the pump is purely automatic. Connection is made with the electric circuit by the two wires shown at top of motor and at the switch in the tank. Water is drawn in a bathroom, in the kitchen, the laundry or bedroom, and as soon as the ball-float has dropped to the point to which it is regulated, the switch is snapped by the weight of the ball in falling, the circuit is closed, and instantly the pump is at work refilling the tank, and it will not stop until the normal level is regained, when the rising float cuts the circuit and stops the motor. This automatic action of the machinery constitutes its leading recommendation. The electrical current being provided the motor and pump are always ready, and there is no use for attendance other than a weekly or fortnightly supply of oil.

The Beardsley Blotter Bath.

The accompanying illustrations, Figs. 7 and 8, represent a blotter-bath device which is being put on the market by the Beardsley Blotter Bath Company, Cleveland, Ohio. It is made under English, Canadian and American patents, January 3, 1888. The bath, which is made of iron, is intended for use in connection with the ordinary letter press, its purpose being to moisten the pads used in copying. Fig. 7 gives a general view of the bath, from which its principle and method of working can be readily apprehended. The water is placed in the reservoir A, and is carried by capillary attraction through the sponge in the tube B to the absorbent pad C, attached to the lid which rests on the sponge in tube B when the bath is closed. The pad C, being curved, also rests on the copying pads D, and in this way the moisture is automatically supplied. The knob E turns the metallic cap over the sponge in tube B, breaking the circuit when it is desired to stop the flow of water. Another tube in the bottom of the iron pan in which the pads are placed for dampening permits the entrance of water from the bottom also. By a simple contrivance the flow of water through this channel can be regulated or shut off so as to produce an even dampness through any number of pads. The bath is well made and finished. Other points made by the company in regard to it are: That no cup or brush is required; that it saves time and labor, and is durable, simple in construction and always ready for immediate use.

In connection with the bath the Perfection Moistening Pads are furnished. These pads are made of cloth tipped at the end with brass strips, as shown in Fig. 8, rendering them convenient to handle, and admitting, it is claimed, of a larger number of impressions while insuring better results with less labor than other pads. The illustrations show clearly the construction of both articles, which seem to be well adapted for the purpose in view.

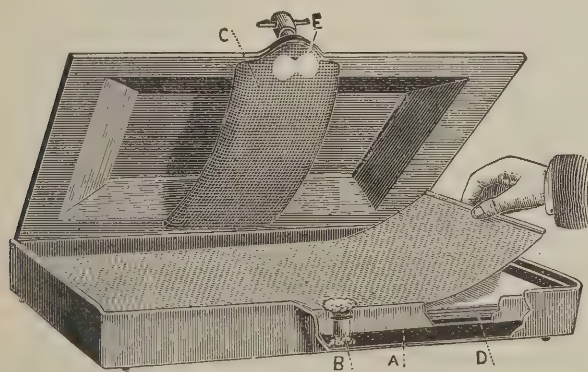


Fig. 7.—The Beardsley Blotter Bath.

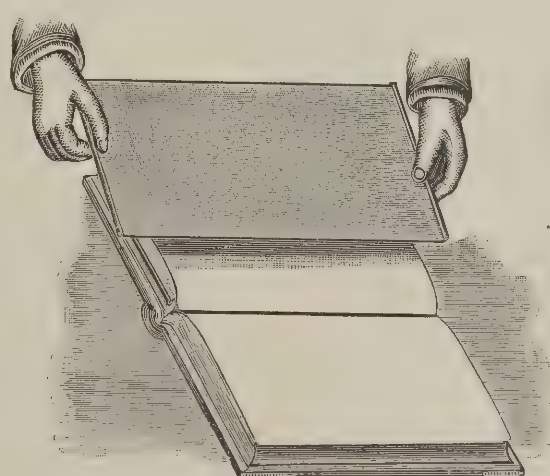
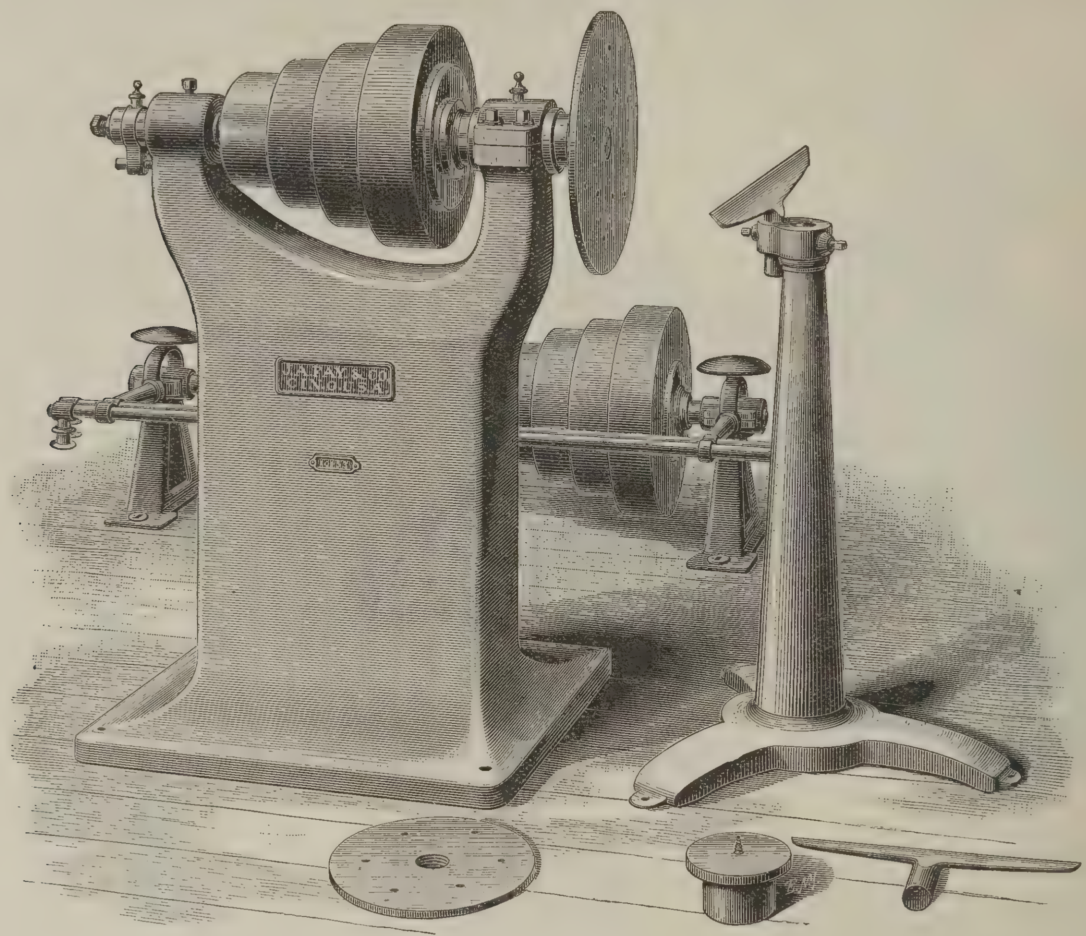


Fig. 8.—The Perfection Moistening Pads.

Large Pattern Makers' Lathe.

Messrs. J. A. Fay & Co., 267 to 285 Front street, Cincinnati, Ohio, are putting on the market a new large pattern makers' face lathe, intended for turning large circular work for use in car and railroad

shops, and wherever patterns are required of large diameters, such as those for gearing, water wheels, pulleys, &c. The lathe, of which we present an engraving



Novelties.—Fig. 9.—New Pattern Makers' Lathe, Built by J. A. Fay & Co., Cincinnati, Ohio.

in Fig. 9, has a very heavy and substantial frame with a broad base, cast in the cored form, and it will swing material 7 feet in diameter. The spindle is made of steel, large in diameter, and carries a cone having four steps, made of cherry. The bearings are long and self-oiling, and arranged to take up wear. The

Fig. 10.—The Wild West Hanger.

front box consists of a babbited split sleeve, in which the spindle revolves, supported in the frame. The rear box has a conical step, adjustable to the tapering bearing of the spindle by means of a screw. This screw has a separate adjustment, held to its place by a set nut, and comes in contact with the end of the bearing in a self-lubricating chamber. This furnishes the step with a constant supply of oil, and relieves the other bearing of friction. The countershaft carries a four-step cone to match the cone on the machine, and has two pair of tight and loose pulleys, securing eight changes of speed, to suit all sizes of work.

The Wild West Hanger.

The Wild West Anti-Friction Door Hanger is made by the Moore Mfg. Company, Chicago, Ill., and is illustrated in Fig. 10. In this hanger the axle is of steel and rolls along to the end of the slot in the rider bar, where it is locked. The wheel then turns on its axle until it starts on its return. This arrangement is referred to as overcoming the objection to a slotted spring in that it prevents cutting of the axle and wear at the ends of the slot in the rider bar. The rider bar is of malleable iron and gives a broad bearing for the axle, about ½ inch, which is referred to as not practicable where the rider bar is made of steel. The wheel is heavy and strong, and is deeply grooved to prevent jumping the track. It cannot be detached from the hanger when not in use. The strap is made of steel and firmly riveted to the rider bar. The points specially made in regard to this hanger are that it is compact, strong, durable, works smoothly and noiselessly, and presents a graceful appearance when on the door.

Adjustable Hand-Drilling Machine.

An adjustable hand-drilling machine, which is put on the market by Frasse & Co., 92 Park Row, New York, is represented in Fig. 11. It is intended especially for fine, sensitive and accurate work. It has a hollow spindle with a split chuck which will take a twist drill from No. 48 to No. 80. The distance from the spindle to the table can be varied from 6 inches down, and is easily adjusted either by raising or lowering the spindle frame of the table bracket, and also by setting the clamp nut under the table. It can also be made self-feeding by simply putting the spiral spring on the table spindle between the clamp nut and the bracket. It has a

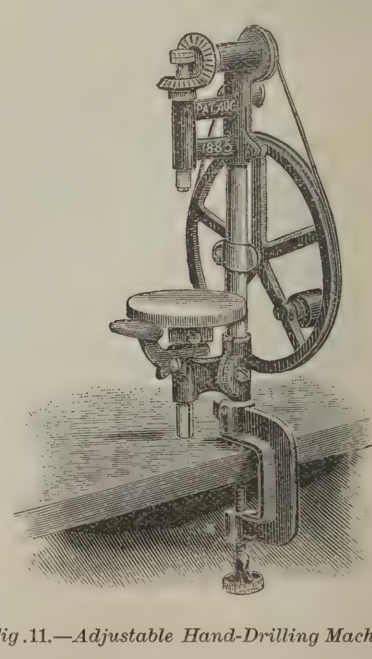


Fig. 11.—Adjustable Hand-Drilling Machine.

friction pulley which is referred to as intended only for use in heavy work, in light work the catgut running directly over the driving pulley. The neatness of the tool

is alluded to, and it is stated that it will be found an excellent tapping machine for small holes. The cut represents it about one-fifth size.

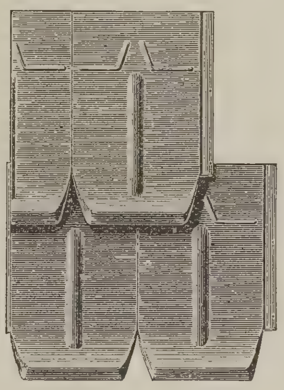
ROOFING NOTES.

Painting Tin Roofs.

From D. C. L., *Paskack, N. J.*—While walking about town the other afternoon I fell into conversation with a stranger, who announced that his home was in the planet Mars, and that he had come to this earth for a few days just to take a look around and see how affairs were managed here. Having got used to his rather exalted language, which I suppose was natural to a dweller in a sphere so high up in the heavens, the thing that most impressed me in his conversation was the celestial independence of his views. He was hampered with none of the notions, traditions and prejudices which make it so difficult for us to form correct judgments, and on this account his conversation was extremely entertaining. Our talk ran mostly on big questions, such as religion, philosophy, systems of government and the like topics that had something in common between us, but suddenly, to my surprise, the stranger abruptly turned the conversation, and pointing to a house that was building near by asked what the red metal was that was being put on the roof. Looking up to where he pointed, there, sure enough, was a red metal roof, but I, with my little previous knowledge of roofs earthly, saw in an instant that it was of tin plate that had been left for a few days to rust previous to applying the paint. The roof I told him was made of a sheet metal commercially known as tin plate, and in reply to his further questioning I explained that tin plate was thin sheet iron coated with a non-corrodible alloy of tin and lead. While giving this information I realized that it was a little ridiculous, for the condition of the roof belied my statement that the sheets had originally a rust-proof surface. Luckily for me the stranger didn't seem to notice the apparent contradiction, and I was congratulating myself on escaping from an awkward dilemma when he asked me if the roof would not soon rust through, or whether it was further protected in some way. I then explained that it was customary to paint the roofs as soon as they became sufficiently roughened by oxidation, and that periodical paintings thereafter kept them in good condition. The stranger's face wore a puzzled look for a few moments, when he suddenly exclaimed: "What under the two moons (an expression he evidently picked up at home) is the sense of first coating your plates with the non-corrodible metal you speak of, since you have to paint them immediately to preserve them." His remark rather staggered me I must confess, but not being up in roofing matters I did not attempt to argue with him, but told him I would write to *Carpentry and Building* and find out, and would send him a marked copy when I got your answer. My starry companion went on to say that he thought it would be just as well to take a thin sheet of iron and paint it as to use tin plates, judging from their rusty condition. He persisted so in exposing my ignorance that finally in sheer desperation I turned the conversation point blank by asking him what gave Mars its peculiar color. His reply, to make the story short, was that long ago an anti-poverty society had been started up there which in the space of a few years did away with all labor and made every one wealthy, and that in jubilation over the happy turn of affairs the whole population turned out and painted the sphere red. The six strokes of the town clock at that moment broke in so suggestively on our conversation that, wishing my companion a pleasant sojourn, I left him sitting on the grass and went home to dinner.

New Square-Nose Tile.

The Thorn Shingle and Ornament Company, of Philadelphia, have recently added to their already large assortment of sheet-metal roofing tile a new design designated as the Square Nose. The accompanying engraving shows the appearance of the tile, and also indicates how the several parts are combined in covering a roof with this article. The sample before us indicates features of construction very closely resembling other patterns of the series. The rib down the middle is slightly concaved in its length, thus giving special strength to the tile. The thickened edge at the bottom is abruptly beveled, thus securing the effect of considerable depth. This edge in laying fits over the raised beads at the top of the next tile below, thus making a water-tight connection. The side joints are of the spring-lock variety. The construction is such in this regard as to firmly attach the several tiles together in a way to be water-tight and



Thorn's Square-Nose Tile.

very strong, and yet provide ample opportunity for all necessary movement due to changes of temperature. The specimen tile submitted for our inspection is painted in a kind of red, to closely imitate the earthen tile now so popular in various directions, and is a handsome piece of workmansihp from whatever point of view considered.

Fire-Clay Shingles.

A form of shingle or tile made of fire-clay, is being put upon the market by J. E. Donaldson, Montezuma, Ind. The first of the accompanying engravings represents a group of three shingles as they appear on the roof, the second represents the underside of a single shingle and shows how the shingles are arranged to interlap. The shape which has been given these shingles would seem to be well adapted for the purpose in view, and the testimonials which Mr. Donaldson is circulating, one in particular coming from the superintendent of the Chicago and Eastern Illinois Railroad Company, indicate that the shingles are held in excellent favor by those who have used them. In the testimonial referred to, signed by A. S. Markley, the statement is made: "We have two buildings covered with your patent shingles. They are giving us better satisfaction than the slate roofs we have, being less liable to break in high winds or vibration of buildings. Being lapped one over the other on both one side and upper end combines them all together. The winter just past has been a very severe one on roofs of this kind; but there is not the slightest indication of any defects whatever." The merits as presented by the maker include the following points: Cheapness and durability; fire and frost-proof; convenience in laying and convenience of repairing. The statement is made with reference to the latter that, in case of a breakage, a single shingle can be removed and a new one substituted without changing the other shingles. The

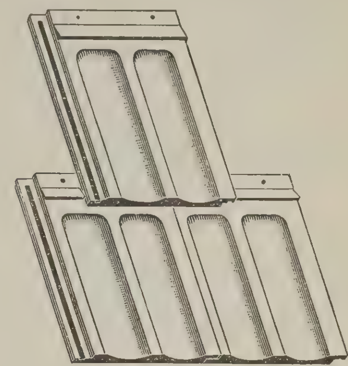


Fig. 1.—A Group of Donaldson's Fire-Clay Shingles as they Appear on a Roof.

shingles are said to be non-conductors, and the rain-water collected from the roof is as pure as from a slate roof; 250 shingles make a square, and the weight is given as 500 pounds to the square.

In a recent letter received from C. B. Cooper, president of the National Sheet Metal Roofing Company, 510 East Twentieth street, New York, a very interesting account is given of the means of transportation of some Queen Anne shingles which they have recently supplied to go to Mardin, Turkey, the shipment being made under the auspices of the American Board of Foreign Missions. To reach their destination the shingles have to be carried no less than 16 days' travel on the backs of donkeys. Accordingly the shingles were put up in packages weighing 150 pounds each. Two of these packages are swung, one on each side of the animal, and together are considered a load. We wonder what some of our Western friends would think if their only chance of getting sheet-metal shingles was to have them transported by such a tedious and expensive method.

One of the new buildings about to be erected in the city of Allegheny is described by a local paper as a new "temple of charity," and belongs to the Little Sisters of the Poor of that city. The architects are Messrs. Bickle & Brennan. The building has a frontage of 112 feet, with two wings ex-

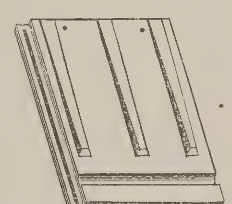


Fig. 2.—Underside of Shingle, Showing the Arrangement for Lapping.

tending 97 feet, covering a court in the main part of the building. The depth of the main building is 40 feet and the hight to the cornice is 50 feet. The first 8 feet of the walls will be of cut stone, above this the front will be of brick with stone trimmings. The building will be brick heated by steam and covered with a slate and tin roof with galvanized iron trimmings. The cost estimated is some $60,000.

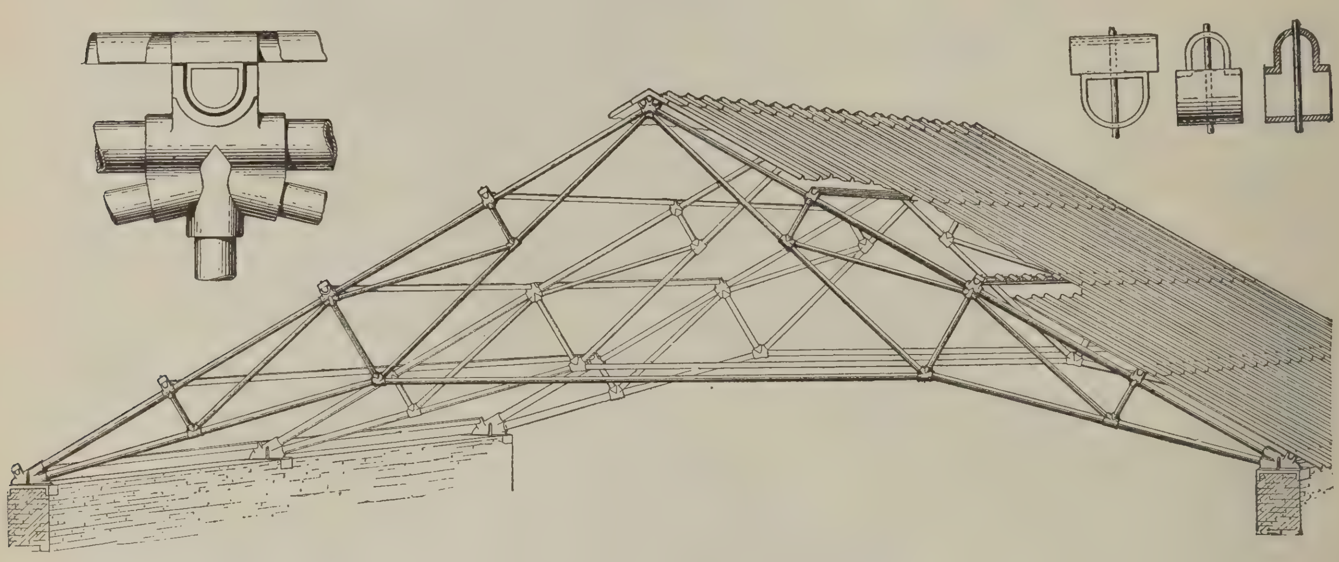
A peculiar form of cap or anchor for metal roofing, by which the same is adapted to be laid over iron or wood framing without sheeting boards, was patented a short time since by Benjamin F. Caldwell, of Wheeling, W. Va. The cleats consist of long strips adapted to be

used to incase an I-beam or solid wooden rafter, as the case may be, and be joined on the underside by a lock joint.

Improved Metal Roofing.

We illustrate in the engraving on this page an improved method of constructing metal roofing, practiced by Messrs. Hodges Bros. (the Hodges Steel and Iron Construction Company), of Detroit, Mich., and which is at once substantial and inexpensive. An item of considerable cost in such roofing has heretofore been encountered in the joints by which the roofing and purlins and the rafters are united. This is overcome in the present instance in a simple manner, which will be readily understood from the illustration. It will be noticed that U-iron is used for purlins instead of pipe, and cross blocks or fillets, as shown at the upper right-hand corner, are employed at the intersections. These cross blocks are made up of two blocks of cast iron, one of them shaped upon its upper side for the reception of the roofing material. If the roofing is channeled or corrugated, as shown, then the upper portion of this piece is shaped to fit the corrugation. The under side of the piece is provided with a convex bearing, running at right angles to the upper surface. This fits into an upper concave surface on the lower block, and this, in turn, is again concaved on its under side for resting properly on the pipe rafters. A bolt or rivet passes down through the roof plate, the two blocks, the purlin and the rafter and binds the whole securely together. Of course, the trusses may be made in the usual variety of ways, and those will necessitate corresponding fittings at the points where the braces meet.

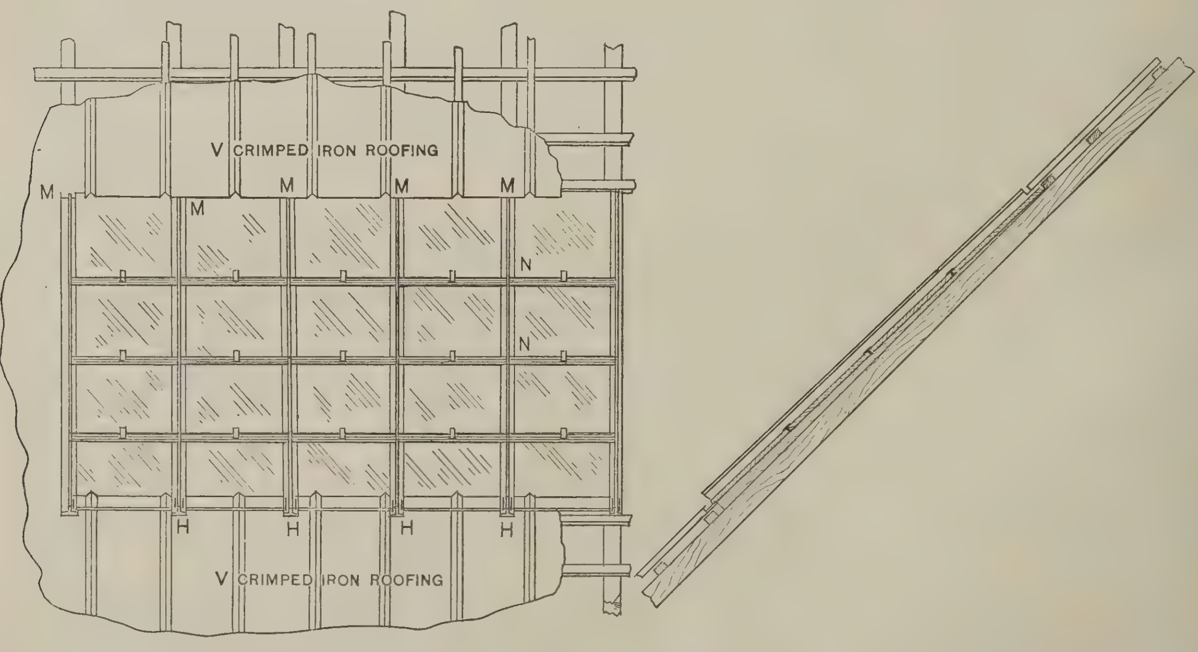
Instead of employing bolts or nuts, the roofing and blocks, purlins and rafters may be fastened together by any convenient means, as, for instance, by any suitable clamp. This peculiar joint is not limited solely for roofing purposes, but is equally applicable wherever two or more such elements are to be joined together substantially as the roof plate, the purlins and the rafters are here joined together. So, also, the blocks may be so grooved or shaped as to permit the pipes to cross the block at an angle other than a right angle. It is also adapted for the connection directly of channeled metal, metallic sheeting or siding, or roofing to a purlin or brace alone. It will be observed that each corrugated sheet is overlapped on the same plan as shingles are laid. The intermediate cross fillets are made of cast or malleable iron, and fill the channels at the intersections. Thus the entire structure is practically joined together as securely as though it were cast in one mold, and its ability to withstand wind or storm pressure is beyond a question. We need perhaps scarcely add that this method of construction can also be utilized in forming outside walls for warehouses, railway depots and other structures.



Improved Method of Metal Roofing, Designed by Messrs. Hodges Bros., Detroit, Mich.

Skylights on the Cincinnati Centennial Building.

The skylight work on the buildings of the Centennial Exposition, which was opened in Cincinnati a short time since, involves some features of construction that will interest our readers. The buildings were put up in a remarkably short space of time and the roofing and skylight work was hurried quite as much as any other part. This work was under contract by Thomas Lee, No. 46 Race street, Cincinnati, who agreed to execute it within a certain period of time, with a penalty per day for excess of time and a bonus per day for time gained. The



Skylight on the Cincinnati Centennial Building.—Fig. 1.—Plan View and Longitudinal Section of Skylight Section, with Roofing Courses Above and Below.

fact that considerable time was saved made the contractor the recipient of a large sum over and above his contract price. The work was somewhat peculiar in character, and through the courtesy of Mr. Lee we have drawings illustrating parts of it and a description of how it was performed. The engravings upon this page have been made from the drawings in question. Referring to the sketches the object in view will at once be apparent. The original

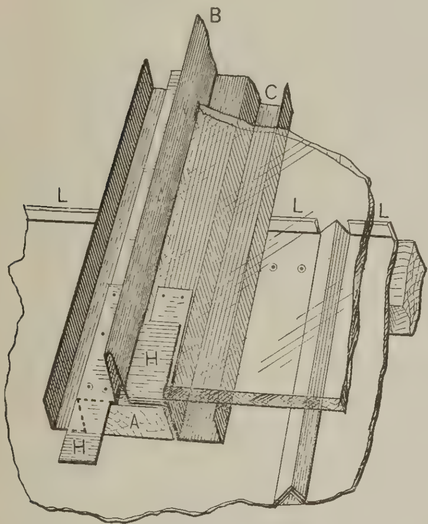


Fig. 2.—Perspective View of Skylight Bar at Bottom, Showing Glass Overlapping Iron.

specification called for what is termed a "monitor" skylight. The roof was to be stripped and covered with corrugated iron. The skylight, as shown in the drawings presented herewith, was finally adopted as being the simplest in character and the most practical under the circumstances. A V-crimped roof was also adopted. A flat surface was deemed preferable to a corrugated surface. The bars of the skylight rest upon a strip 2 inches by 1 inch, which was nailed upon the rafters. The iron roofing laps 4 inches over the skylight glass at the top, while the skylight in turn rests upon the iron roofing at the bottom, lapping there 4 inches. A gutter runs along the top, as shown in Fig. 3, into

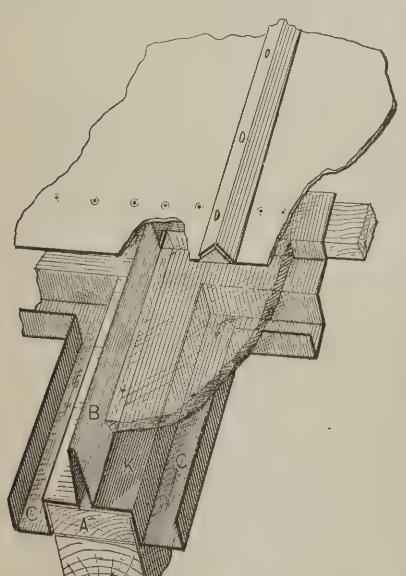


Fig. 3.—Perspective of Skylight Bar at Top, Showing Roof Overlapping Glass.

which the bars are mitered. The head of the bar or ridge is reduced to ¼ inch on top for 4 inches, in order to come out on a level with the glass and to permit the iron roof to fit down closely. The general view, Fig. 1, represents a plan and section of the work. Referring to the letters thereon N represents a cross-bar. Between the bars clips were used to hold the glass in its bed. These were in the form of iron strips, the shape of which is revealed in the engravings. The top gutter is shown, being in line with the letter M, representing the lower edge of the roofing. In Fig. 2 a section of the bottom is shown, in which H indicates the method of holding the glass from slipping downward. It will be seen at L L that the iron is turned up so as to form a barrier to beating rains and drifting snow. As already mentioned, the glass laps over the iron roofing for a space of 4 inches. The space between the glass and the roof, it is claimed, forms an excellent ventilator. In Fig. 3 a section of the cross-bar is shown, with an indication how it is mitered to the bar B. E indicates small crimps to conduct any leakage to the main gutter. F and G show the glass-holders. The cross-bar gutters enter the main-bar gutter, as indicated. Fig. 5 shows a side view of one of the standing seams or bars of this skylight, and shows in elevation some of the parts shown in perspective in Figs. 2, 3 and 4. Mr. Lee informs us that no soldering was done on this skylight, except soldering the strips H in Fig. 2 to prevent snow slides from opening them out. The very large amount of space covered by this plan, and the severe tests to which the work has been subjected since it was finished, seem to be evidence of the general utility of the plan employed. Those who have examined the work feel that Mr. Lee is entitled to the credit of substituting something simpler and less expensive than methods heretofore employed upon work of this class.

How Long Will a Tin Roof Last?

From B. & H., *Weissport, Pa.*—What would be a reasonable length of time to warrant a tin roof to last, put on with the best quality of IC roofing, ordinary pitch and standing seam, the workmanship to be

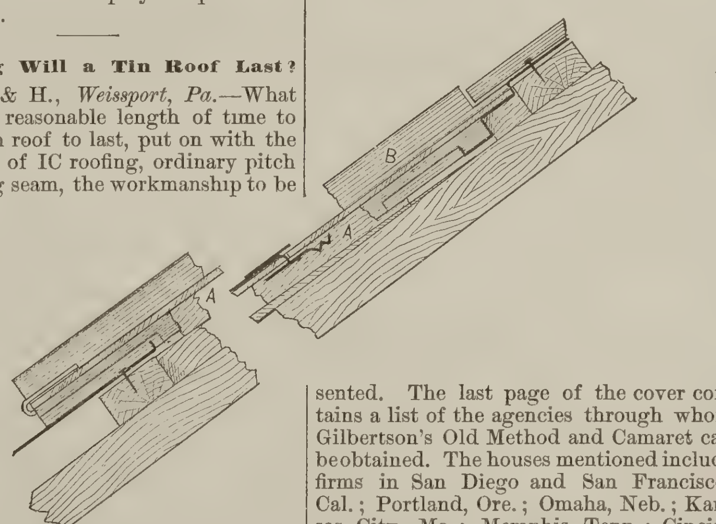


Fig. 5.—Side Elevation of Bar Enlarged.

first class and the tin painted every three years?

Answer.—It would appear that there would be no limit to the time that tin should last, if it is kept from the action of the air by means of paint, and is not worn or injured by walking or other causes. It may be said that it is not the use, but the abuse, that causes tin roofs to wear out. The writer once saw some tin that had been taken off from a roof that was well painted on top, but the under side was covered with rust so as to be full of small holes—that is, the tin had rusted from the under side, even though the top had been well painted. It must be evident that neither the roofer nor the painter could have any control over the contents of the

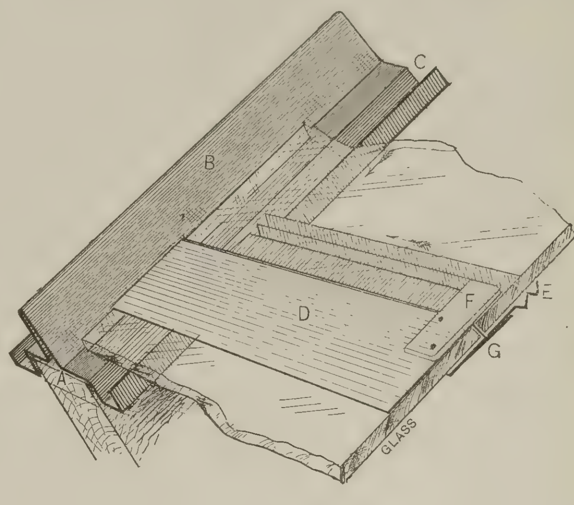


Fig. 4.—Perspective View Showing Cross Joints and Clips.

building, and if some kind of business was carried on in it that would produce fumes that would injure the under side of the tin, it would be hardly fair to blame the roofer for the rusting of the tin. It would appear, therefore, that circumstances over which the roofer has no control whatever may decide the length of time a tin roof will last, so in warranting a roof other things besides the quality of the tin and workmanship are to be taken into consideration.

Merchant & Co. have recently issued a third edition of a little pamphlet which they prepared some time since entitled, "Facts about the Manufacture and Relative Values of Roofing Plates and About the Laying of a Good Roof." It contains much information that is of value to those in the trade, and all is attractively presented. The last page of the cover contains a list of the agencies through whom Gilbertson's Old Method and Camaret can be obtained. The houses mentioned include firms in San Diego and San Francisco, Cal.; Portland, Ore.; Omaha, Neb.; Kansas City, Mo.; Memphis, Tenn.; Cincinnati, Ohio; Louisville, Ky.; Cleveland, Ohio; Detroit, Mich.; Buffalo, N. Y., and Pittsburgh, Pa.

The new building of the Fidelity Title and Trust Company, located on Fourth avenue, near the Petroleum Exchange, Pittsburgh, will be an elegant and imposing addition to the architecture of that city. The frontage is 46 feet, the depth 120 feet and the building is estimated to cost, including the ground, $200,000. The roof trimmings, we believe, above the cut-stone front, are to be of sheet metal, while the roof itself is also to be of metal.

TRADE NOTES.

IN ANOTHER PART of this issue the Charles W. Spurr Company, foot of East Tenth street, New York, with Boston office at 35 Bedford street, direct attention to Spurr's patent wooden carvings which they manufacture, and request the trade to send for catalogues and also to inclose a small amount for samples. Inasmuch as the samples which these manufacturers are sending out make desirable mantel ornaments and are veritable curiosities to those who are not familiar with the process by which they are made, the advantage would seem to be altogether in the interest of the buyers. We have several of the carvings manufactured by this company in our parlor and they never fail to attract the attention of visitors.

THE ENGLE SANITARY AND CREMATION COMPANY, with New York office at 30 State street, have issued an illustrated circular descriptive of the Engle Crematory, for the destruction by fire of any substances, either wet or dry, which are dangerous to health and offensive to the senses. The principle involved in the invention of Mr. Engle lies in the use of two fires at opposite ends or sides of the substances to be consumed, and in so managing the fires that one of them operates to volatilize the liquid constituents of the substances, while the other operates to burn the steam and other gasses which arise from the volatilization. It also consists in so arranging the fires as to conclude with the process of burning the dry residium or reducing it to a fertilizer if desired.

THE MUNSON LIGHTNING CONDUCTOR COMPANY, Indianapolis, Ind., have prepared a very handsome sample case for their agents. It contains a section of the rod which this company are supplying and also a point with indications of joints—just the thing that is needed as a foundation for a conversation between agent and buyer.

WE HAVE RECEIVED from H. Maack a prospectus of the Academy of Architecture and Building located at 3066 South Ninth street, St. Louis, Mo., of which he is the principal. The institute was founded in 1885, and is intended to meet the wants of the building tradesmen by educating young men belonging to these trades, cultivating their minds, and enabling them to meet the requirements of life in general and to follow intelligently the progress of the mechanic arts.

THE PROGRESS ENGINE AND MACHINE WORKS, Summerfield, Md., some time since furnished one of their Kirkwood Wrought-Iron Wind Engines for use at Red Top, the residence of President Cleveland, near Washington. They have recently issued a circular, the principal feature of which is an illustration showing a general view of the President's country seat, with the wind-mill indicated. On the circular is a very handsome testimonial concerning the satisfaction with which this machine has been used in the interval since its selection, signed by A. A. Wilson, U. S. Marshal, who had in charge the improvements on the property in question and countersigned by the President. Many of our readers will be interested in sending for a copy of this circular, which is mailed free to all applicants.

EDWIN A. JACKSON & BRO., 50 Beekman street, New York, manufacturers of the well-known Jackson Ventilating Grate and Fire-Place Furnace, announce that 90 of their grates have been ordered for the new court house in St. Paul, Minn., and that a large number are in use in Columbia College, New York. This is a strong indorsement of the utility of the special form of heating apparatus which they are manufacturing.

THE WARREN-EHRET COMPANY, 428 Market street, Philadelphia, direct attention in another part of this issue to their line of rosin-sized building papers, cements, prepared roofing, &c.

HODGES BROTHERS, Nos. 4 and 5 Whitney Opera-House Block, Detroit, Mich., request the trade to send for samples and price lists of their sheet metal lath, an illustration of which is presented in their card which appears in another part of this issue. The lath in question is of the variety that may be described as slashed, being made of sheet metal, appropriately slitted and formed so as to secure the greatest strength with perfect clinch.

ONE OF THE MOST EXTENSIVE exhibits at the Centennial Exposition of the Valley of Ohio, now in progress at Cincinnati is the display of wood-working machinery of the Egan Company, of that city. The attempt has been made to make this display the standard exhibit of wood-working machinery. The display comprises 16 machines of new design and provided with all the latest conveniences and improvements. All the machines are highly finished, and wood-workers in general who have the opportunity to visit the exhibition named will gain much that is of interest and value to them by an inspection of this department.

CHARLES A. STRELINGER & Co., of Detroit, Mich., send us a copy of their catalogue No. 12, of tools, supplies and light machinery for wood-workers. It is one of the most complete works of its kind ever issued. It is 200 pages in extent and is gotten up in the thorough manner peculiar to this house. It contains matter of great interest to mechanics and wood-workers in general and should be in every collection of trade publications. Accompanying the catalogue is the form of order blank which this firm are supplying to all their correspondents as their requirements may be.

F. A. WRIGHT, secretary of the Architectural League of New York, No. 47 Liberty street, New York, informs us that he is desirous of obtaining a complete list of all the architectural societies, sketch clubs, artistic bodies and other organizations whose objects embrace the promotion of the fine arts. He desires to be put in correspondence with the secretaries of such societies, and says he will be under obligations to any one who will give him their addresses. As a result of this inquiry he proposes to forward for publication a list of the societies, properly tabulated, when the information has been obtained. We trust any of our readers who are able to co-operate in this work will communicate with Mr Wright, whose address is given above.

TOCH BROTHERS, 35 Bowery, New York, are directing special attention to their Mortar Stains. They are also importers and manufacturers of paints, oils and varnishes, and supply, in addition, wood stains, builders' acid, special front oil, brushes and other similar goods. With reference to their mortar stains, which they claim to be the best now before the public, they offer a sample to all applicants by mail.

A PATENT has recently been granted to W. J. Boda, of Dayton, Ohio, relating to the finishing of house interiors. In his specification the inventor sets forth a plan of constructing the door frame, window casings, &c., by which the maximum of the work can be done in the shop and the cost of erection of the building itself reduced to a minimum. Some very interesting features of construction are shown. We understand that it is the intention of Mr. Boda to manufacture house trimmings upon this general plan for the trade.

HARTMAN & DURSTINE invite the trade to send for illustrated catalogue and price list of Hartman's Patent Inside Sliding Window Blind. They mention that this is the only blind furnished with an automatic burglar-proof lock, free of charge. Withrow & Hillock, Toronto, Canada, are manufacturers for the Dominion.

THE LOUISVILLE WOOD MANTEL MFG. COMPANY invite the trade to send for catalogues of their wood mantels. Their address is 348 Fourth avenue, Louisville, Ky.

ELLRICH & Co., of Plantsville, Conn., offer to send to any person supplying ten or more names of neighbors or friends interested in good tools a copy of "First Quality of Tools," and for 10 cents addition, to pay postage, they offer a pocket wrench, an article which will be generally appreciated, we think, by our readers.

THE IDEAL SASH PULLEY, which has the special advantage of rapid application, is offered by the Stover Mfg. Company, of Freeport, Ill., in their card in another part of this issue. They request the trade to send for circulars and price lists.

H. C. ROOT'S Stair Builders' Tangentograph, for quickly and automatically determining the angle for face molds and bevels for joints, and also useful in hip-rafter problems, is shown in the card of the manufacturer in another part of this issue. It is a tool that is likely to interest practical stair-builders, and also those who desire to learn stair-building and who wish a short cut—in other words, a mechanical expedient to avoid the tedious drafting which is necessary in the solution of stair-building problems by the old methods.

THE GURNEY HOT WATER HEATER COMPANY, 237 Franklin street, Boston, Mass., present in another part of this issue two illustrations of their heater and also a list of their selling agencies.

E. VAN NOORDEN & Co., 383 Harrison avenue, Boston, Mass., are directing attention to their metal skylights, which they manufacture for shipments to all parts of the country.

THE CINCINNATI CORRUGATING COMPANY, of Cincinnati, Ohio, state that in anticipation of strikes in the Western iron rolling mills they have accumulated over 2000 tons of sheets of regular sizes for roofing purposes. They ask the trade to remember this fact when they want orders executed promptly.

G. W. EVERETT, 11 East Tenth street, New York, directs attention in this issue to his new idea in weather strips. He wants to arrange with live mechanics in every part of the country to introduce these goods.

Chinese Tools.

From a letter recently received from a correspondent in a city with an unpronounceable name located somewhere within the Chinese Province of Mongolia, we quote the following observations on the native carpenter and his tools:

Have just been having a time with the carpenters trying to get them to make a good joint. We are framing timbers for a shaft, and it is quite necessary that the joints should be well made, for the sins of one joint are perpetuated in all the other timbers as they are put in. The natives do very well with the tools they have. All their Saws are like the ordinary Buck Saws, and they are all sharpened as Rip Saws, but are used indifferently for ripping or cross-cutting. A line is made by snapping a string run through india ink and water instead of a chalk line, and their pencil is a piece of bamboo split up at the end and dipped in ink. The Chisels are like ours, only far clumsier. Their Planes are like ours also, save that they are pushed by both hands on a cross-bar handle across the top of the Plane just behind the blade. Squares, Bevel Squares and the like are made by themselves from wood as they are wanted. Rabbeting Planes and other special tools they likewise make when wanted, starting on the basis of a plane blade. A Miter Box they know not, and I think I must show them its virtues. Their Hatchets are about the size and shape of our Lath Hatchets, but with about three times the amount of metal in them. A Broad Axe they do not have, but the Adze is in constant use. The blade of the Adze is about 3 inches wide and over all some 4 inches in length. Opposite the blade is a socket fitting on a wooden shank, which carries a straight handle. Their drills fit into a wooden shank, which is revolved by a strip of leather with one or more turns around the spindle, and with the ends fastened to a straight stick, which is sawed like a fiddle-bow across the shank. The Drills are sharpened like our Drills for iron. A constant source of surprise is the suppleness of the native workman. You often see a carpenter standing by a waist-high bench, with one foot on the ground and the other holding a piece of wood on the bench while he saws or planes it. They are very fond of sitting down to their work in positions we could not assume. A cramped position to a native is an impossibility, though it might be achieved by forcing him into a trunk.

Steel in Foundations.

The use of steel rails for the foundations of large buildings has long been followed in the spongy soil of Chicago. Some of the more recent large structures have combined the use of steel beams with rails, notably the Edison Electric Light Company's building and the great auditorium in which the National Republican Convention has just been held. The Tacoma building, now being erected on the corner of Madison and La Salle streets, under the direction of Holabird & Roche, architects, is the first to use steel beams exclusively for foundations. This building will be 12 stories and an attic in hight, and is intended for offices. Its walls will therefore be very massive and the partitions will be supported on large pillars built up from the ground. The foundations for the walls and pillars consist, first, of a bed of concrete 2 feet thick, second, of steel I beams of different dimensions, according to circumstances, crossed wherever necessary, and third, of cast-iron plates in the case of the columns. The beams stand on edge, are placed closed together and are long enough to extend from 6 to 7 feet outside of the columns. They are enveloped in concrete after being placed in position, to guard against oxidation and also to secure further rigidity. Over 120 tons of steel beams will be required for the foundations alone of this building. They were adopted in preference to steel rails, because their aggregate cost is about one-third less, as several tiers of steel rails would have to be used to secure the stiffness of the beams, thus more than covering the difference in the cost per ton.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE SUMMER has passed and builders are now engaging upon fall work. A bird's-eye view of the country shows that business has been fairly good for architects and builders so far this year from one end of the land to the other, notwithstanding certain disturbing circumstances. It is Presidential year; as usual much attention is given to politics, and some over-cautious people think it best to wait awhile before starting any new enterprise, and yet the building business has gone on through a large section of the country as though there were no distracting questions of general policy before the people. The crop prospects, throughout the West particularly, are excellent, and many people are induced to build on this account who otherwise would have deferred investments in houses. While in many directions the architects of the country have done as much the present year as they did last year, it should be remarked that the larger part of their work has been buildings of the cheaper classes. Builders' work has been made conspicuous this year, for the most part, not on account of the large structures erected, but by reason of the great number of small buildings. Taking the country over, more dwellings of an unpretentious class have been erected this year than is usual. If causes for the activity in house building were to be sought, among those to be noted would be the following: Labor has been well employed for several years past and savings have been made; the accumulations of loan and building associations are everywhere being used in the erection of dwellings. There is a constantly growing desire among the workers of the country to own their own homes, and this alone diverts money from other channels into houses. Another way of putting some of the general facts to be noted would be to state that the country has advanced and the people have moved along with it in prosperity. Many are able to build houses this year who have not been in position to do so in the past. Through the instrumentality of associations or by the expenditure of the hoardings of years people are providing themselves with homes to an extent to make building work far more active than it could be without this source of trade.

AN article entitled "The Direct Production of Pure Heat from Coal," which, we believe, was first published in an English journal, has recently had an extensive circulation throughout this country. The system it describes may have some very valuable features, but, nevertheless, some of the statements contained are so extraordinary that we think they deserve a word of comment. The inventor of the system, Mr. W. A. Gibbs, was called upon by a number of India tea planters to devise a method by which pure hot air suitable for drying tea could be obtained from waste wood or coal. After considerable time spent in experimenting he succeeded in constructing an apparatus which, it is claimed, fulfills all the requirements. This furnace or apparatus is described as a brick chamber about 5 feet long by 2 feet wide and 2 feet high, built upon the ground. At one end is a feed and a fuel chamber and at the other a powerful fan. Between the chamber and fan are baffle plates, splitting plates, a standing bridge with perforations at the back, and a hanging bridge with perforations at the front. There are also a number of carefully proportioned inlets to the pipes to supply the exact quantity of air required to produce perfect combustion. The success attending his efforts is claimed to be due to the manner in which he has succeeded in proportioning the air supply to the needs of the fire.

WITHOUT going into further details it may be interesting to refer to the results as printed in one of our foreign exchanges. When the fire was started and in good running order there issued from the fan-mouth a column of hot air 12 inches in diameter, and marking on the thermometer a uniform temperature of 500° F. It was stated that no trace of smoke or discoloration was visible to the eye, nor any odor or taste perceptible to the senses. The reporter states that he held his face in this blast and that except for the excessively high temperature he experienced no inconvenience. It has never been our misfortune to be brought in contact, for any length of time, with air at the temperature specified, and, however pure it might be, we doubt very much whether the results would be pleasant. However, we have only a printed record to go by and so can only express our surprise. The report alludes to several tests to which the apparatus was subjected, including the drying of moistened tea, which showed no depreciation in quality or change in flavor.

THE extraordinary thing about this story is that the air which was drawn directly from the fire was said to be perfectly pure. We can readily understand that by a careful regulation of the draft and air supply the escaping gases might be kept entirely free from smoke, but how the inventor succeeded in annihilating the carbonic acid which was necessarily formed is something which we do not comprehend. As coal was burned in the furnace the products of combustion must have included either carbonic acid or carbonic oxide, or both. No extra supply of oxygen or nitrogen could have destroyed the carbon which would be present in some form or other in the escaping air. So far as the purity of the product is concerned we think it safe to say, therefore, that it was confined to the simple absence of smoke, and that it contains the usual proportion of poisonous carbon gases. If any of our readers may happen to notice this article to which we refer, we would advise them to be skeptical of the statements concerned until a further exposition of the system is given to the public.

WITHIN the past six or seven years development in the line of what may with some reason be termed domestic motors has been unusually rapid, and in addition to several of the older and already well-known engines of this type a large number of new forms have been brought into extensive use. We need perhaps scarcely explain that under the head of domestic motors may be embraced those engines which are mainly designed with the view of being intrusted to unskilled management, and which accordingly dispense with the use of an independent power generator, such as a steam boiler. It is interesting to note, however, that the demand for such engines has not been limited to those who cannot provide for attendants with any engineering qualifications worth speaking of, but has extended to a large number of power users who have found that such motors efficiently meet their requirements. The application of small engines of special make to such home services as pumping water and running ventilating fans and sewing machines is familiar, and has apparently had the effect of demonstrating that even larger powers, required for the heavier work of operating printing presses, small machine shops, electric light installations, &c., can be satisfactorily obtained without resorting to steam engines or to water-wheels which require a special location and usually expensive accessories.

AT the present time the gas engine is undoubtedly performing the largest share of the work done by the whole class of domestic motors, so-called, and, in many instances, has shown itself to be a formidable rival of the steam engine, successfully driving machinery for which only a few years ago it was considered not at all well adapted. In capacity the engine has experienced a steady increase, the originally small sizes of fractional horse-power, and of one, two and five horse-power, though still turned out in large numbers, having been followed by 10, 20, and, quite recently, even by 50 horse-power engines —ample evidence of the growing popularity and fitness of the motor for comparatively heavy duty. From the single-cylinder engine it was but an easy transition to a design calling for two cylinders, and this again prompted the building of four-cylinder engines, some of which, of

the Otto type, have been turned out abroad, the aim being, we understand, to secure greater regularity of working and higher economy in point of gas consumption. Simplicity of construction is a very important matter—in fact, it is of the first importance in any engine which is to suffer the abuse of untrained handling, and, despite some of its shortcomings, the single-cylinder gas engine will, therefore, in all probability, remain in favor for some time. This seems to be borne out, moreover, by the fact that nearly all the recent designs are of this type, a circumstance of which the weight will be all the more appreciated when it is considered that such designs have been brought out in large number, foreign engineers having been particularly active in this respect.

CLOSELY allied to the gas engines are the various forms of petroleum motors, which have been given prominence of late. In these a mixture of air and petroleum in the form of vapor or spray is introduced into the cylinder and fired. Where a supply of gas is not available, these engines offer special advantages, and would seem to be assured of a favorable reception; and it is but natural therefore that both in this country and abroad their introduction is being vigorously prosecuted. Hot-air engines are now so well known that we need scarcely more than mention them here. Their principal use hitherto has been confined to pumping water in buildings, for which purpose they are peculiarly well adapted and extensively manufactured, one works alone in New York turning out about 600 per annum. While it is questionable whether for the present they will be employed to any very great extent for general low power purposes, it is interesting to note that they are built by several engineering firms with this end in view, and are also employed in the English and in the United States lighthouse services for compressing air for operating fog-horns. Their simplicity and convenience are generally recognized, but these good features are in a measure overshadowed by the fact that, compared with other motors of equal power, they are large and cumbersome pieces of machinery.

IN the line of water motors there has been no lack of progress, and small power users now have the choice of a large number, all of them being claimed to be efficient and generally satisfactory. In some localities where a comparatively high water pressure is maintained in the city supply pipes, these motors have been used to the exclusion of many small engines of other types designed for similar work, and, to all appearances, with very good results, their entirely harmless character, ease of management and cleanliness tending largely to make them popular. One of the later arrivals in the field of small engines for household and other uses is the electric motor, of which the wide range of usefulness is at once apparent. Its application to driving elevators and ventilating fans has secured for it a fair proportion of public favor, and has more recently been followed by its adaptation to pumping and other work of a general character. For obvious reasons, however, its use is at present limited to special localities. Before leaving the subject we cannot but refer to the several forms of small steam engines which are now on the market, and which, while embracing steam generators, have been designed specially with the view of being managed by unskilled attendants. The boilers are heated by kerosene, and the whole outfit is perfectly automatic in its working, the regulation of the fires, steam-pressure, water-level, &c., being entirely independent of the attendant. The element of danger from carelessness or ignorance is thus practically eliminated, and the engines are not without just claims to a place in the class of motors which we have considered.

EVER since the days of Franklin lightning rods have been in varying favor with the public, and every few years new systems of applying them have been introduced. Not long since it was considered by far the best practice to insulate lightning rods and to run them from the roof to the ground in the manner of telegraph wire. Later investigation, however, gave rise to the belief that it would be better to connect the rods with all the piping and ironwork about a building and to fasten them to the wall by metal supports, so that the whole house, together with its included ironwork, would be in one circuit. The plan, however, of connecting the rods with the gas and water-pipe systems have been objected to on the score that the joints of the pipes being packed with red lead, and in various other ways, insulated the sections to such an extent as to make them dangerous for electrical conductors. This latter belief has gained such currency that a German investigator has recently thought it of sufficient importance to look into the subject thoroughly with a view to ascertaining what warrant there was for the theory.

HIS first test was upon a system of gas-pipes some 250 feet in length, containing 117 screw joints caulked with red lead. It was found that the joints gave varying resistances, but the conclusion reached was that metallic contact between pipes secured together with red lead may be considered good. A number of additional experiments were made, confirming the conclusion reached in the first instance, and it was also shown that in no case would the electrical current be carried to any considerable distance underground, as the surface of the pipe would permit ample discharge even in a dry soil. Even where the resistances of the pipes ran very high, it was considered advisable to connect the lightning rods with them inside the building in order to prevent discharges from leaping from the rod to the pipes, which would endanger the pipes as well as the building itself. The paper to which we have alluded treated the subject with the usual German thoroughness and was of a distinctly scientific character, all of which may be considered as strengthening belief in the correctness of the author's conclusions.

THE SEASON is not so very far off when the traveling as well as the stationary public will meet the annual problem of ventilation. Instructions, rules and regulations innumerable have been laid down, showing how buildings should be constructed, so that the inmates could have a plentiful supply of fresh air, and it is pleasantly true that, notwithstanding many exceptions, houses of the present day are much better ventilated than heretofore. So much for the people who stay at home. But how is it with those who, at the call of business or pleasure, spend part of their time in conveyances of one kind or another? Do they get their reasonable share of fresh air during the winter months? Every one who travels must answer this in the negative. From the poor plebeian who pays 5 cents for the privilege of breathing the stuffy atmosphere of a horse car to the wealthy aristocrat who smothers in a limited express train at a cost of something less than $50 per day, all who think must realize that the luxury of traveling is marred by at least the one discomfort of bad air. The intermittent traveler particularly recognizes this evil, for his senses are not dulled by continuous endurance, and the foul atmosphere of the horse car, the railroad train or the steamboat cabin proves almost overpowering by contrast with what he customarily enjoys. A traveler unhappily burdened with the sense of smell will find it difficult to determine in what particular class of conveyances his olfactory nerves are most offended. To travel a few miles in a crowded horse car on a wet winter's day will almost persuade him that his lungs have reached their limit of endurance, and he will likely consider the horse car one of the most disagreeable abiding places on the face of the globe.

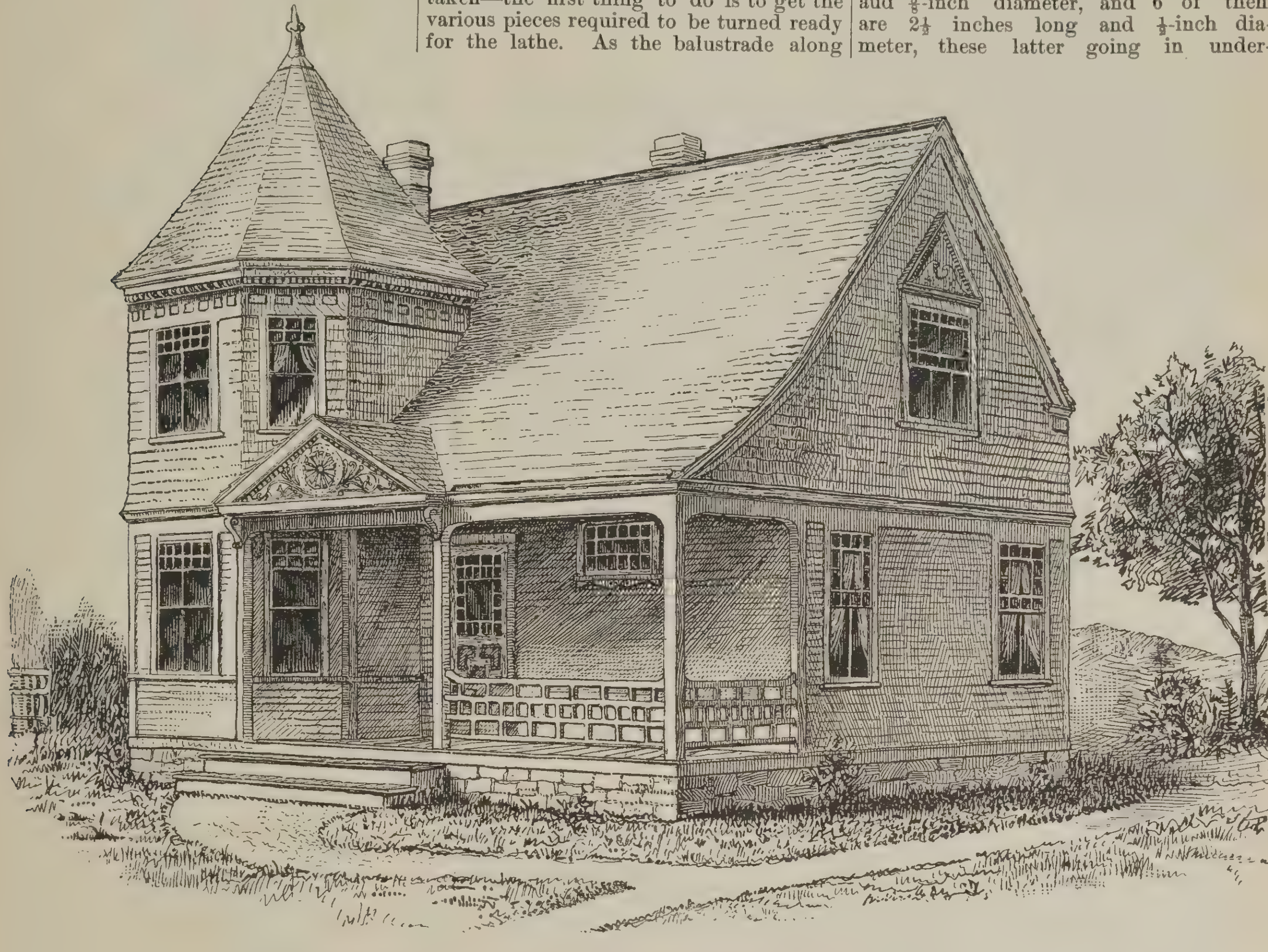
NEXT DAY our traveler may have occasion to cross from Manhattan Island to Jersey City or Brooklyn on one of the many ferryboats here that were built somewhere about Fulton's time. The peculiarly sickening stench that he will find pervading the unventilated cabins will convince him that a horse car is a rolling sanitarium by comparison. The oppressive air breathed by the occupant of the lower bunk of a sleeping car or the inside stateroom of a river boat is a disagreeable feature only too familiar to those who go about. To multiply examples would serve no purpose, as the evil of unventilated vehicles everywhere prevails. If the transportation companies—railroads, for instance—would devote some of the money they spend on the costly decorations of a palace car to introducing a proper system of ventilation, blessings from all quarters would shower on them. But no, the railroad companies think that the traveler is happy so long as his body is given comfortable support and his eye tickled by tasteful surroundings, and they waste neither thought nor money on providing a pure atmosphere. It is a little humiliating when we stop to consider that meat killed in Kansas City is shipped East in cars elaborately fitted with devices for keeping the air fresh, while human freight is transported without enjoying any such expensive luxury. Let it be hoped, however, that reform in this matter will overtake vehicles, now that it has accomplished so much with fixed abodes.

THE PLATES.

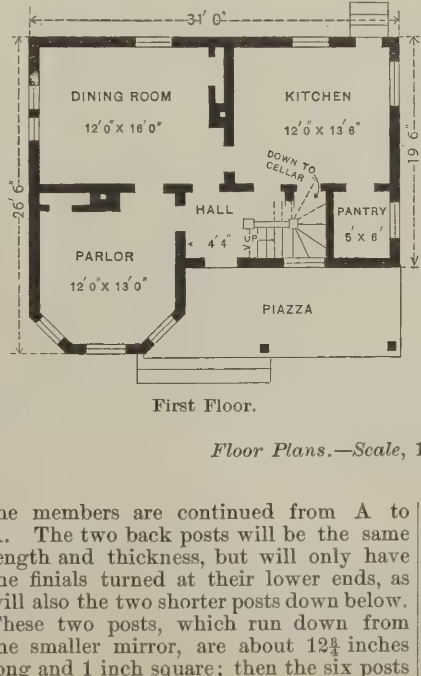
Our plates this month are devoted to the elevations and plans to scale, and details full size, of a wall cabinet, a full description of which appears in another part of this issue. The ornamental work is in part turned and in part fretted or scroll sawn. The very full account of how this article may be constructed will no doubt interest many of the amateurs among our readers.

Design for a Cottage.

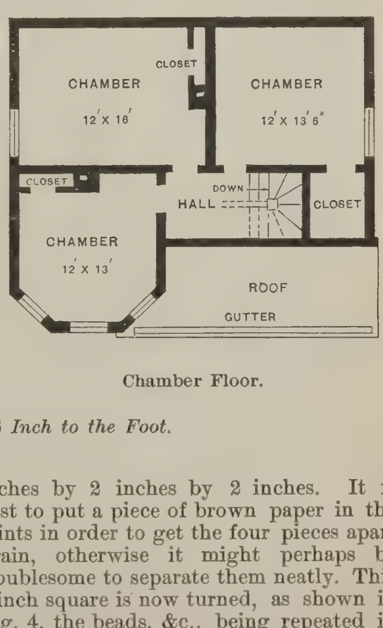
The story-and-a-half frame cottage, shown in the accompanying perspective, elevations and details, was designed by E. H. Hammond, 4 West Thirteenth street, New York. It is in a style of architecture that is very popular at the present time. The floor plans show that there are provided on the first floor a parlor, dining-room and kitchen, with spacious pantry. On the chamber floor, three commodious bedrooms are provided, together with a large clothes-press. The details shown on succeeding pages show features of construction.



Design for a Country Cottage, by E. H. Hammond, Architect, New York.



First Floor.



Chamber Floor.

Floor Plans.—Scale, 1-16 Inch to the Foot.

Wall Shelves in Turned and Fretted Work.*

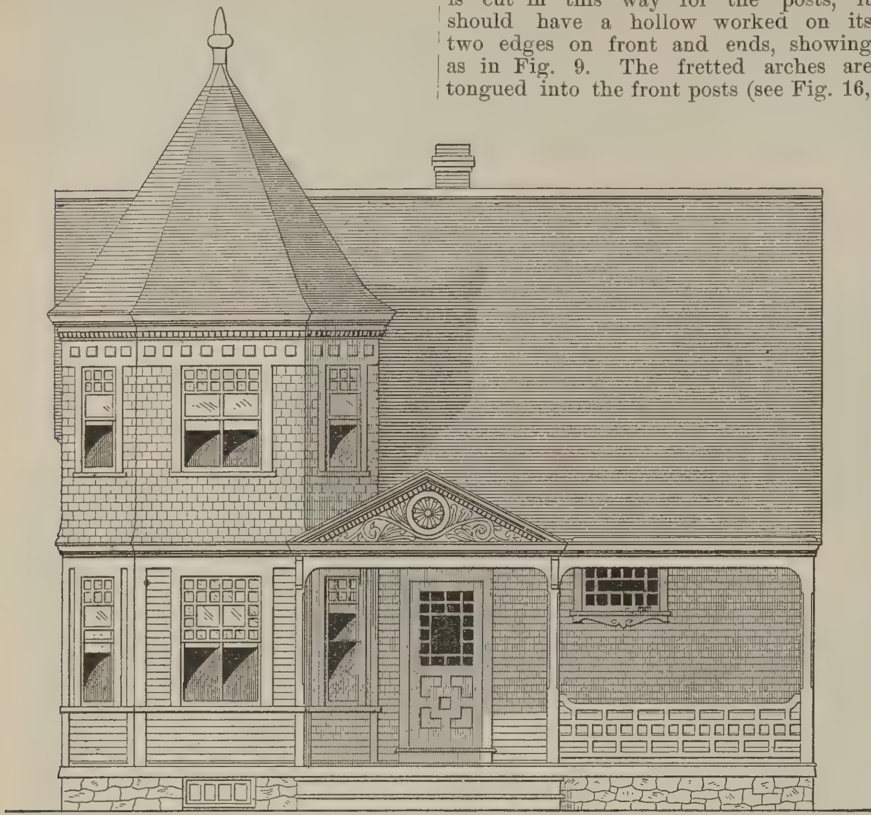
BY A. MARTIN.

It is no uncommon thing to find in a room a piece of wall space which requires more than a picture, no matter how good, to make it look satisfactory; and it is for such a place that the wall shelves illustrated in the plates this month are intended. The article consists of a shelf, with an arcading of turned and fretted work in front, with a mirror behind to reflect the ornaments placed in front of it. Below that is a smaller shelf, with a mirror behind it as well; while the top, with turned balusters and fretted center-piece along the front edge, may be utilized for showing some large plates or vases. The wood our wall shelves are to be made of must be settled before much can be done. Oak or magohany would, either of them, be quite suitable. The elevation and plan are drawn one-sixth real size, or 2 inches to the foot. By this scale the whole job will be found to measure about 3 feet high 2 feet wide and to stand 8 inches out from the wall. All the rest of the diagrams are drawn full size.

The first thing to do after setting out all the main sizes full size on a board—a proceeding that will save much trouble afterward, for from it all the measurements for every different piece of wood will be taken—the first thing to do is to get the various pieces required to be turned ready for the lathe. As the balustrade along the top will be made separately, the four front posts are only taken up to the under side of the top, and will, therefore, be about 1 foot $10\frac{1}{2}$ inches long and 1 inch square. The finial at the foot of pillar is shown in Fig. 22, and the rest of the turning in Fig. 19, where, it must be observed, the members are continued from A to A. The two back posts will be the same length and thickness, but will only have the finials turned at their lower ends, as will also the two shorter posts down below. These two posts, which run down from the smaller mirror, are about $12\frac{3}{4}$ inches long and 1 inch square; then the six posts in the top balustrade are $6\frac{1}{2}$ inches long, allowing for a pin being turned on their lower ends, $\frac{5}{8}$ inch in diameter and $\frac{5}{8}$ inch long to enter the top, thereby fixing the balustrade in its position. The turned finial for these six post is shown in Fig. 22. There are 30 spindles wanted altogether; 24 of these are 3 inchEs long aud $\frac{5}{8}$-inch diameter, and 6 of them are $2\frac{1}{2}$ inches long and $\frac{1}{2}$-inch diameter, these latter going in underneath the lower shelf. The members for each of those sizes are given in Figs. 21 and 23. The enrichment in the cornice is turned, too. To do this, however, four pieces of wood must be got, 14 inches long and 1 inch square; dress them up and glue them into a square block, 14 inches by 2 inches by 2 inches. It is best to put a piece of brown paper in the joints in order to get the four pieces apart again, otherwise it might perhaps be troublesome to separate them neatly. This 2-inch square is now turned, as shown in Fig. 4, the beads, &c., being repeated in all its length. In Fig. 5 is given a section

* For illustrations, see plate pages.

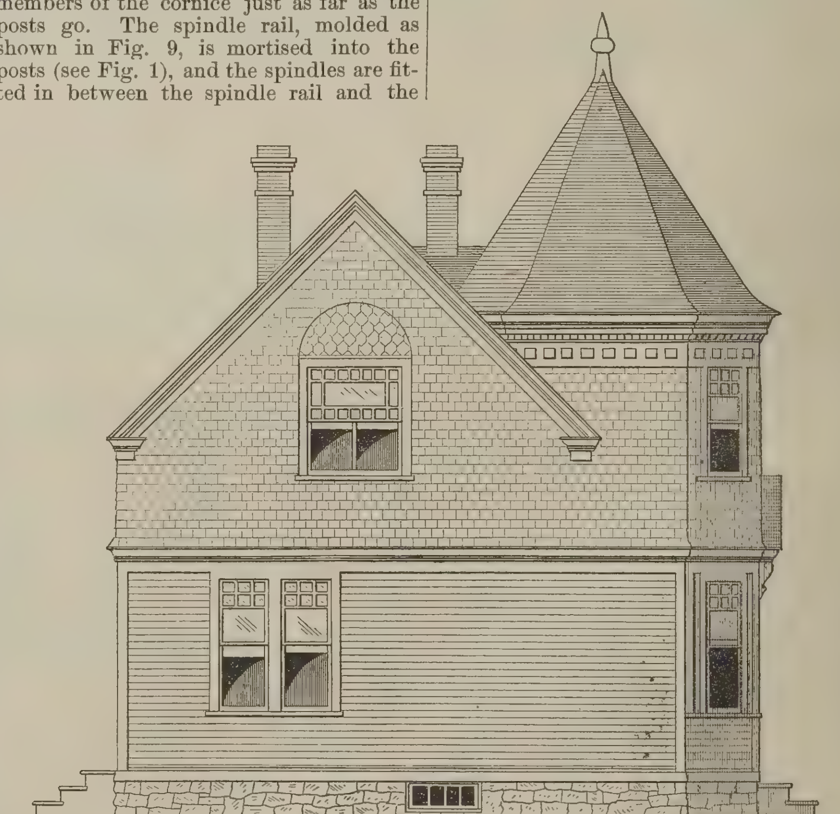
of this ready for splitting into its four parts, which are to be planted in the cornice, as will afterward be explained.



Design for a Country House.—Front Elevation.—Scale, ⅛ Inch to the Foot.

All the turning being done, we now proceed with making the frame around the large glass. The uprights are about 1 foot 8¼ inches long by 1⅛ inches wide and ¾ inch thick, and are checked for the glass, as shown in Fig 8. A top rail, 1 foot 9½ inches long by 1½ inches wide, by ¾ inch thick, and a bottom rail of the same length and thickness, but 2¼ inches broad, are mortised into the uprights, forming an opening for the glass of 1 foot 5¼ inches long by 1 foot 7¾ inches. To the outside of this frame are screwed the two outside posts of the back (see Fig. 8). The two short posts have a center rail 1¾ inches broad and ¾ inch thick, checked to receive the glass, and a lower rail ⅝ inch wide and ¾ inch thick, and molded as in Fig. 9, mortised into them at the proper position (see Fig. 1), and those posts, checked themselves for the side brackets and for the glass (see Fig. 25), are half-checked into the lower rail of the frame already made, as shown in Fig. 24, where the dotted line shows a section of this rail where not interfered with by the half-checking of the two posts. The pieces at sides of small mirror are now fitted into their places, when they may be fretted, as shown in Fig. 17. Observe that the backs of these pieces are flush with the back surface of the posts, which are grooved to receive the tongues left on them.

The spindles and fretwork below the lower shelf may be next put in. The fretted piece is shown in Fig. 18, where a tongue is indicated for fixing to the two rails. The face of this fret should stand down $\frac{3}{16}$ inch from the face of the rails. When everything is ready this back may be glued up. The front posts are then prepared to receive the shelf. The two center posts are checked ⅜ inch deep and all the thickness of this shelf, which is itself cut, as shown in Fig. 26, where the dotted line shows the position the post occupies when in its place. The two end posts are worked in the form of a dovetail to receive the corner of the shelf. Fig. 6 is a sketch of this dovetail in the post, while Fig. 27 is a sketch of the corner of the shelf prepared to fit into the post. Before the shelf, however, is cut in this way for the posts, it should have a hollow worked on its two edges on front and ends, showing as in Fig. 9. The fretted arches are tongued into the front posts (see Fig. 16, which is a section of one of the center ones). These arches go up behind several members of the cornice just as far as the posts go. The spindle rail, molded as shown in Fig. 9, is mortised into the posts (see Fig. 1), and the spindles are fitted in between the spindle rail and the



Side Elevation—Left.—Scale, ⅛ Inch to the Foot.

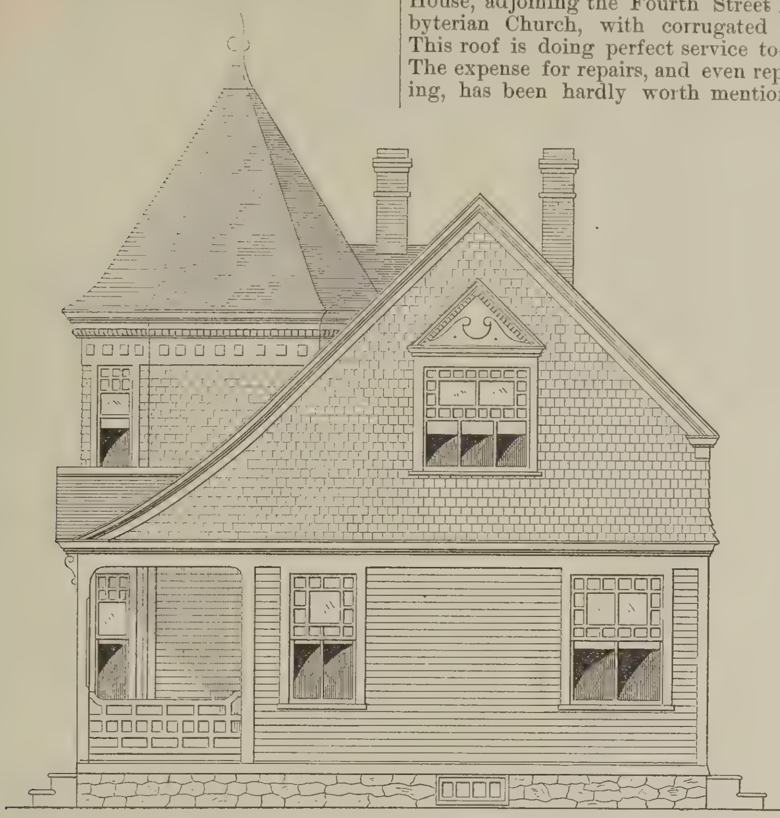
shelf. The spindle rail and spindles are fitted on the ends, and the end arches are tongued into the front and back posts. As these end arches are only 1½ inches wider than the two small front arches, they will be so very like each other that it is not necessary to show them. The two brackets under the large shelf are shown in Fig. 15, where at each end is shown a tongue to enter the posts prepared for them. When all are fitted properly these brackets and arches may be taken out and fretted as shown in the various diagrams. Fig. 7 gives half of the center front arch, and Fig. 12 half of the side ones, the one dotted line showing the center line, and the other one the parts covered with the cornice molding. Fig. 12 is drawn upside down in order to save space, but that need be no drawback to understanding the figure. Those parts of the fretting that have lines drawn across them other than those representing the grain of the wood, of course, are to be set down from the surface. This is easily managed with a sharp chisel, and greatly improves the look of the fretting and brings the design out in greater relief. To get the cornice put on, the front posts must be cut down to the surface of the arches for 1⅜ inches from the top. This is done to get one clear surface to fix the molding to, as it is much easier than checking the molding around the posts. In Fig. 13 is shown a section of the cornice, the first member of which is 1⅜ inches broad and ⅜ inch thick, with a hollow worked off the under edge; this is mitered around the end. Then the turned enrichment is split up into four pieces; two of these are required for the front and should be joined to the center, so that a bead coming next V part will completely hide the joint; while the other two are required to continue the enrichment on the ends. Take care to have the beads, &c., mitering at the corners, for if they do not a very ugly corner will be left. When these are all fast, the top, ⅝ inch thick and molded on front and end, is screwed down, completing the cornice, as shown in Fig. 13. When the balustrade on the top is fixed down, it will hide all the nails which fasten the top in its place.

The little narrow shelf is 1 foot 4½ inches long, 5 inches wide and ½ inch thick. Its front corners are rounded (see dotted lines in Fig. 3), and its edge is molded, as in Fig. 10. The back edge of this shelf should be cut at each end like Fig. 28, so that it will fit against the dif-

ferent surfaces and lock into the space left for it in the piece shown in Fig. 17. The brackets supporting this shelf are shown in Fig. 14. They are tongued into the post behind, and a pin into the shelf keeps it in position, while both brackets and shelf are screwed through from behind.

The balustrade along the top is the only thing now to put together. The center fretted piece is tongued into the two posts and cut as in Fig. 11, the shaded portions, as before, being set down from the surface. The spindles are fitted into two rails ⅝ inch wide and ⅜ inch thick, which are mortised into the posts; the pins left on the posts then fasten the whole thing in its place.

All the work should be carefully polished, and the darker in color it is finished the better. The glass should be beveled-edge glass, as the beveling adds so much sparkle and brightness to the appearance. To fasten it to the wall ordinary wall plates may be attached to the back, through which nails are put into the wall, unless there be woodwork to which it can be attached. Great care should be taken in doing this, in order to prevent any disfigurement to the wall, which is easily caused by injury to the plaster, by dents and fractures caused in drawing the nails.



Side Elevation—Right.—Scale, ⅛ Inch to the Foot.

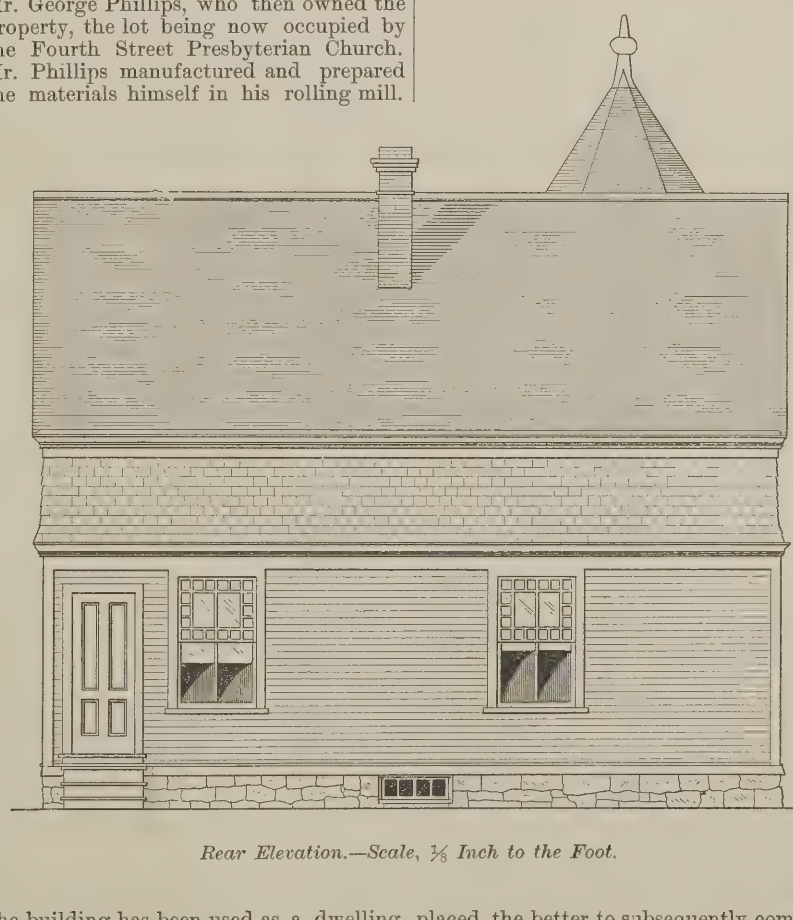
The Life of an Iron Roof.

The Cincinnati Corrugating Company have obtained some valuable information from Mr. W. A. Meninger, of Covington, Ky., who has had upward of 35 years' experience in the roofing trade in that vicinity, on the life of an iron roof. Mr. Meninger stated that in 1856 he put up a corrugated-iron roof on what was then known as the Clayton Young House, at No. 33 West Fifth street, Covington, which is now occupied by the sisters of Notre Dame as a school. This roof did first-class service and gave good satisfaction until about ten years ago, when, upon some changes being made in the building, it was taken off. The material composing it has since been sold to different parties and is now in use for covering various sheds, stables and other small buildings in Covington and vicinity. In 1861 Mr. Meninger covered the Charles Whitcomb House, adjoining the Fourth Street Presbyterian Church, with corrugated iron. This roof is doing perfect service to-day. The expense for repairs, and even repainting, has been hardly worth mentioning. In 1863 he put a similar roof of corrugated iron on a brick building erected for Mr. George Phillips, who then owned the property, the lot being now occupied by the Fourth Street Presbyterian Church. Mr. Phillips manufactured and prepared the materials himself in his rolling mill. The building has been used as a dwelling house most of the time since then, and this roof has answered its purpose admirably. It is now in a remarkably good state of preservation, considering that it has had no attention in the way of repairing for a number of years.

Mr. Meninger also cited the history of a number of old-time iron roofs with which he is personally acquainted. The old Howe warehouse on Market space had over it for over 30 years an iron roof. After affording complete protection for this long period, and over an almost flat surface, it was removed about three years ago. The Licking Rolling Mill has a corrugated iron roof which has been on it for over 25 years, and to Mr. Meninger's certain knowledge, it has never had a coat of paint since it was first put on. The Kentucky Central Railroad shops in Covington were originally furnished with a corrugated-iron roof, which remained for over 23 years in a good state of preservation, and was only recently removed on the occasion of some repairs and changes.

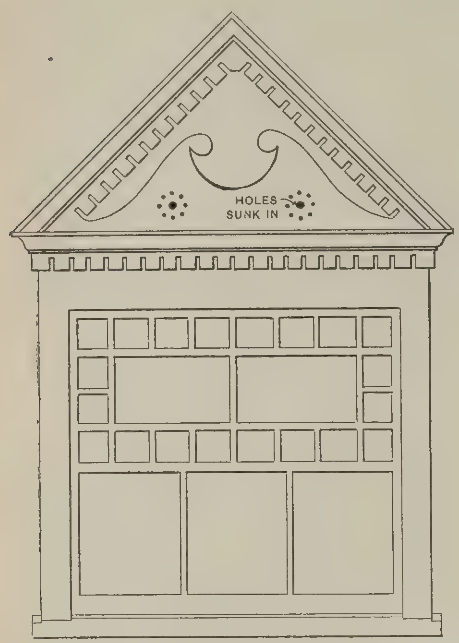
Test of Fireproof Wire Lathing.

A special train from Broad street station, Philadelphia, a few weeks since, took out to Germantown Junction a large number of architects, builders, insurance men, and parties connected with the iron and steel trade, to witness a comparative test of the durability under fire of the ordinary wooden lathing, now generally used, and the fireproof patent stiffened wire lathing of the New Jersey Wire Cloth Company. A substantial two-story brick structure, about 8 by 12 feet in size, had been erected, with a stout dividing wall in the center, making two compartments. One apartment had its ceiling of wooden laths, nailed to joists and plastered over, and the other of wire cloth, upon which the plaster had been spread. A hot fire was built in each compartment after everybody interested had an opportunity to inspect the preparations by going up a ladder to the top of the structure, upon which no roof had been placed, the better to subsequently compare results. At the end of ten minutes, when the fire was extinguished, the wooden lathing had burned away, the plaster had fallen into the ashes beneath, and the joists became charred from the flames. In the other compartment, where the wire cloth



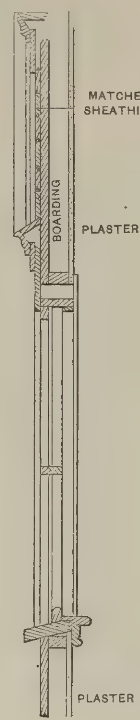
Rear Elevation.—Scale, ⅛ Inch to the Foot.

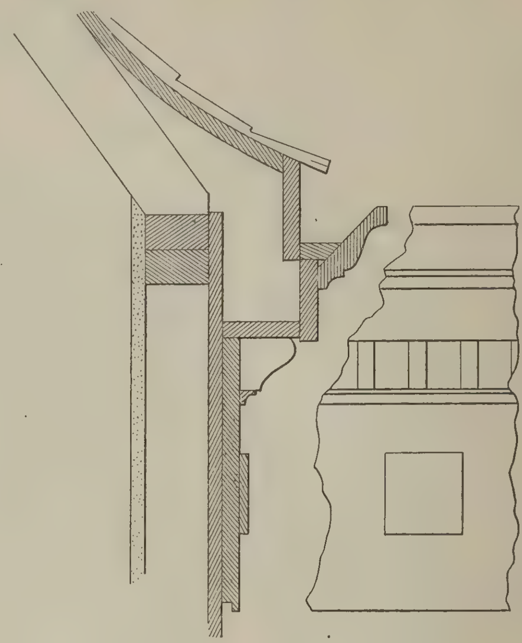
was used, it and the plaster remained intact at the end of that time, as it did over an hour afterward, when the fire there had been allowed to burn out. The test seemed to meet the general approval of the spectators, who commended the use of the wire lathing in buildings intended to be fireproof, or, at least, slow burning. C. W. & H. W. Middleton, 945 Ridge avenue, Philadelphia, are the selling agents for the wire lathing above mentioned.



Window in Gable.

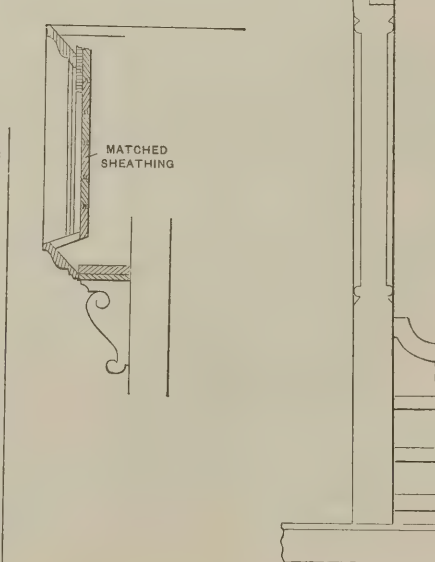
Scale, ⅜ Inch to the Foot

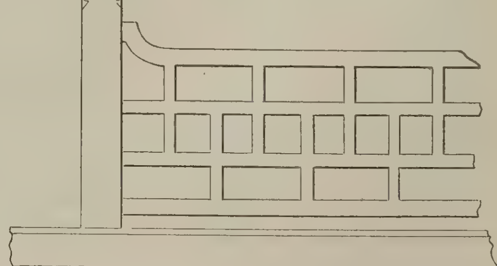




Tower Cornice.

Scale, ⅜ Inch to the Foot.





A Country House.—Details of Piazza.—Scale, ⅜ Inch to the Foot.

The Neutral Axis of Cast-Iron Beams.

A matter of some importance to engineers and builders is the position of the neutral axis in beams. W. H. Barlow some time since instituted experiments with reference to determining this matter, so far as cast-iron beams are concerned. His conclusions are given as follows:

It has long been known that under the existing theory of beams, which recognises only two elements of strength—namely, the resistances to direct compression and extension—the strength of a bar of cast iron subjected to transverse strain cannot be reconciled with the results obtained from experiments on direct tension, if the neutral axis is in the center of the bar. The experiments made both on the transverse and on the direct tensile strength of this material have been so numerous and so carefully conducted as to admit of no doubt of their accuracy; and it results from them, either that the neutral axis must be at or above the top of the beam, or there must be some other cause for the strength exhibited by the beam when subjected to transverse strain. I was desirous that experiments for determining the position of the neutral axis should be made on such a scale and in such a manner as to place this question beyond doubt, and with this object two beams were cast, 7 feet long, 6 inches deep and 2 inches in thickness. Two were employed in order to avoid errors which might arise from accidental irregularities of the metal. Considering the very minute quantities which had to be measured and the numerous causes of disturbance to which observations of so much delicacy were liable, such as changes of temperature or want of perfect uniformity in the dimensions or texture of the beams, the results point out the position of the neutral axis as the center of the beam in a manner so decided as to remove all further doubt upon this subject not only in the smaller strains, but in the larger ones also, which, in the case of the second beam, were carried to about three-fourths of the breaking weight.

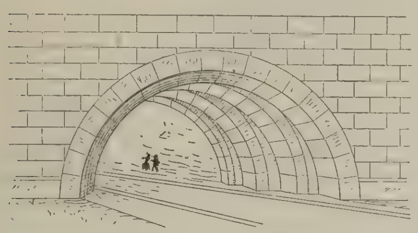
The Philadelphia Manual Training School held its first annual commencement exercises a short time since, and about 60 pupils received their diplomas. Prof. Wm. L. Sayre, the principal, presided. Superintendent MacAlister in an address, said: "What the Manual Training School means for every boy is an education broader, more comprehensive, more humane, more elevating than any heretofore offered in the history of the world. For years the world has been moving in this direction, for making education more human, more in the direction of training, and fitting boys to enter well prepared into the battle of life. It is a school which seeks to strengthen the intellectual culture of its pupils. The boy, in place of feeling with mere abstraction, with mere words, comes into contact with things, with this great, real universe in which we all live, and, therefore, his intellectual thought is most profound, his thought is more real to him."

MASONRY.

Masonry and Stone Cutting.

(Continued from page 129, June.)

The modern skew arch with spiral courses is not an improvement on the ancient forms of skew arches we have studied in our last



Masonry.—Fig. 38.—General View of Skew Arch.

lesson, but has an entirely independent origin. With the laying out of railways, bridges with skew arches were unavoid-

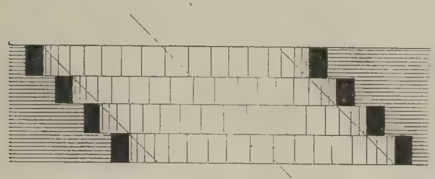


Fig. 39.—Plan of Skew Arch.

able, and therefore our modern engineers set themselves to solve that problem. At first they got over the difficulty by constructing the bridge out of a series of arches, each with its center on the center line of the skew passage, as shown on plan (Fig. 39) and in perspective (Fig. 38). Several bridges of that kind are to be found on the Paris Lyons railway lines; their appearance is unsightly, and there is no connection between the several rings of the arch, which are really only independent arches set side by side.

In searching for an arch where the beds would be continuous the engineers reasoned thus: In each ring of a skew bridge the bed joints are perpendicular to the face wall, and radiate from a point on the center line of the arch. If the number of rings were augmented so that each ring would become as thin as a sheet of paper, then the soffits of the rings would practically form the continuous soffit of a skew arch, and the bed-joints of each ring would form a continuous surface. As in each

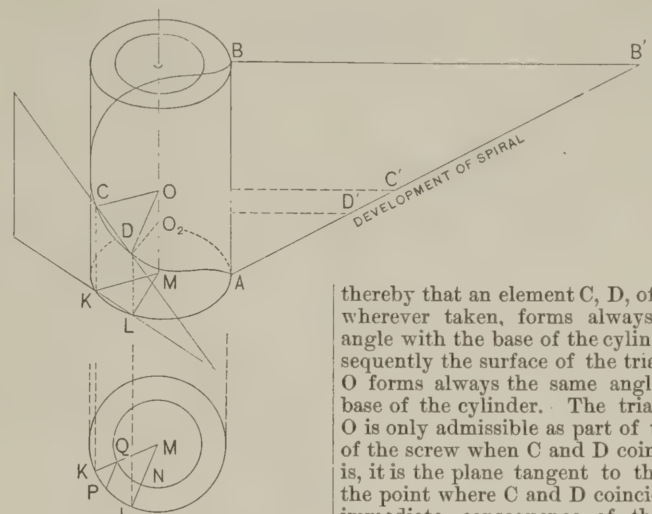


Fig. 40.—Development of Spiral.

ring the surfaces of the bed-joints radiated from a point on the center line of the arch and were perpendicular to the face of the wall, so every narrow slice of the bed-joints, cut parallel to wall face, should radiate from a point on the center line of the arch and be perpendicular to the face of the wall. Now, this is the surface of a screw, as can be seen, Fig. 40. If we simply roll a set-square over the surface of a cylinder, the series of its points of contact C, D, &c., will form a spiral; the edge of the set-square may be considered as the prolongation of a small element C, D, of the spiral, so small that the points C and D would be coincident; and we see thereby that an element C, D, of the spiral, wherever taken, forms always the same angle with the base of the cylinder. Consequently the surface of the triangle C, D, O forms always the same angle with the base of the cylinder. The triangle C, D, O is only admissible as part of the surface of the screw when C and D coincide—that is, it is the plane tangent to the screw in the point where C and D coincide. As an immediate consequence of the constant angle formed by every element of a spiral with the base of its cylinder, spirals develop as straight lines A B when the cylinders on which they are drawn are unrolled. A B, the distance measured parallel to the axis of the cylinder corresponding to an entire revolution of a spiral, is called the axial length of the spiral.

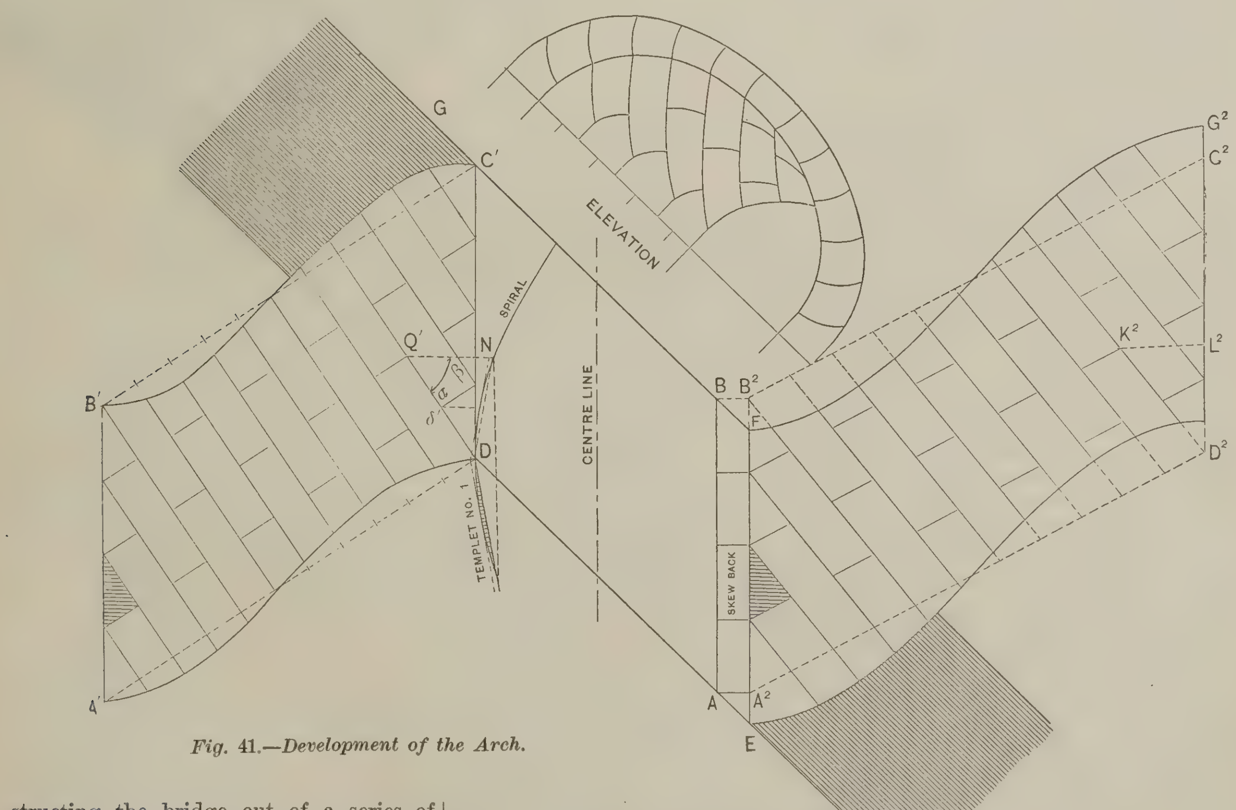
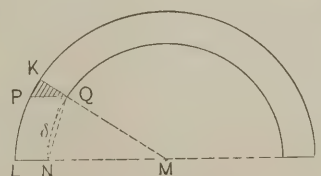


Fig. 41.—Development of the Arch.



Cross Section.

In Dobson's treatise, which we to some extent will follow, there are several ways of delineating the spiral courses, but we shall only describe the one which is recommended as the most practical.

Let A B C D be the plan of the arch (Fig. 41). Unrolling the soffit of the arch on the left-hand side, the head curves of the arch A D and B C will develop into the curved lines A′ D and B′ C. Joining A′ and D by a straight line, we get the de-

velopment of the heading spiral—that is, the spiral which connects A and D on the surface of the cylindrical soffit of the arch. It is to be noted that the heading spiral lies partly within the face of the wall, partly outside it. The straight line A′ D, the development of the heading spiral, is then divided into an odd number of equal parts, and from the points of division we draw perpendiculars to A′ D. These last are the development of the spiral bed-joints; they are called coursing joints or coursing spirals.

To produce a regular division on the face B C of the arch, one of the coursing spiral developments should go through B′ If this be not the case the general dimensions of the arch should be adjusted so as to make one of the coursing spirals pass through B′, which may be done (1) by altering the width of the bridge; (2) by altering its span; (3) by altering the angle of the skew; or, lastly, by a slight adjustment applied to all these data.

The angle made in the development by the intersection of the coursing joints with the impost is called the angle of intrados. The corresponding angle in the development of the extrados is called the angle of extrados.

Arrangement of Heading Joints.—Divide each impost into as many parts as there are divisions cut off on the heading spiral by the coursing joint from B′; and through the divisions on the impost draw development of heading spirals perpendicular to the coursing spiral, breaking joint so as to form a regular bond throughout.

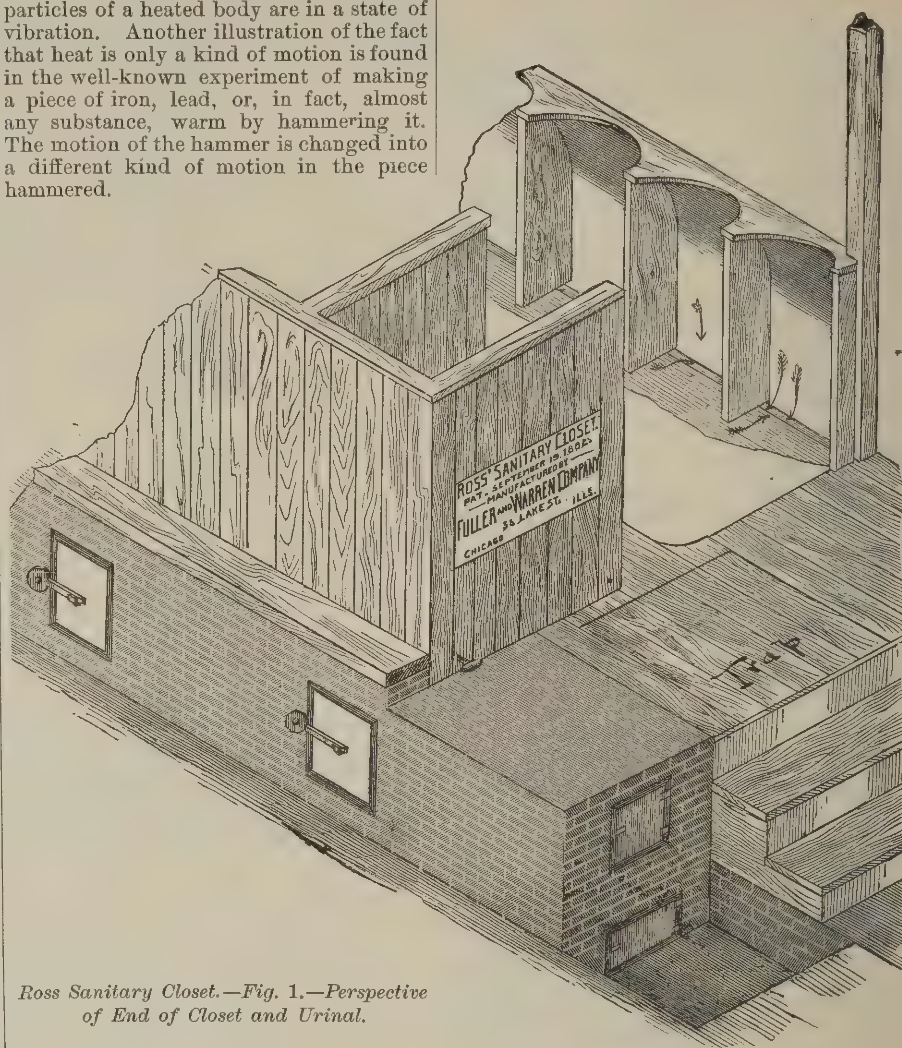
Skew-backs.—The top of each impost must be cut into checks or skew-backs to receive the ends of the courses; and as the beds of the courses are worked to radiate from the center of the cylinder, the checks will be quare to its axis and to the faces of the abutments; the backs of the impost stones should be cut to bond with the masonry of the wall.

To Draw the Elevation.—The curves of the intrados and of the extrados are both portions of ellipses of which the spans are to be taken from the plan, and the hights from the square section. The positions of the joints on the intrados are taken from the divisions on the face-line in the development of the intrados. Their position on the extrados may be formed by developing the extrados, the manner of doing which may require some little explanation.

(To be continued.)

Some Facts About Heat.

One of the most difficult facts to understand is that heat is not a substance, and that cold is only the absence of heat. In many cases people persist in regarding cold very much as a certain man is said to have regarded darkness—he took off the blinds of his cellar windows "to let out the dark." In other words, they think of heat as a something which can go from one substance to another very much as liquids flow. This idea is favored by the old-fashioned ways of speaking of heat which are found in a large number of our books and newspapers. The first thing to understand is that heat is no more a substance than is motion. Almost 100 years ago the famous Count Rumford, one of our countrymen, proved that heat could be produced for an unlimited length of time by simply rubbing two substances together. This he discovered, or rather demonstrated, by boring a cannon with a dull boring bar. In regard to this he reasoned that if so much heat was coming away continually from the boring bar as to keep several gallons of water boiling, it must pass into the bar in some way. Now, the only thing that the boring bar and the cannon received was motion. He therefore concluded that the motion was transformed into heat. This was hardly accepted as fact at that time, but the problem was taken up, and it was not long before it was proved beyond a doubt that "heat is a mode of motion," which means that the particles of a heated body are in a state of vibration. Another illustration of the fact that heat is only a kind of motion is found in the well-known experiment of making a piece of iron, lead, or, in fact, almost any substance, warm by hammering it. The motion of the hammer is changed into a different kind of motion in the piece hammered.



Ross Sanitary Closet.—Fig. 1.—Perspective of End of Closet and Urinal.

Heat being a form of motion, it follows that the weight of a body should not be changed when it is heated or cooled. This we find to be the case, even when the weighing is done with the greatest care. But it occupies more space when warmed. As a rude illustration, a crowd of men require more room when they are all in violent motion than when lying still. So it seems with the particles of matter of which a body is composed. When these particles are most heated they are in the most violent motion and take up more room than when they are at a lower temperature. This explains why it is customary to say that a body is lighter when hot than when cold. It simply occupies more space and so is lighter in proportion to its bulk. All bodies of which we know anything have some heat. Even ice can be heated and cooled, and like any other solid it expands with heat and contracts as it is cooled off. Almost any one who has lived where the thermometer drops down to zero knows that the ice ponds crack in very cold weather. This is due to the shrinkage of the ice. As the temperature rises toward 32° the ice expands, and, if the cracks have filled with water and frozen up, it will be found that the expansion will push the ice outward upon the shore. When there is a sloping shore to a pond it almost always happens that toward spring the ice sheet, which covers the water, has become too large and in many places extends out upon the shore beyond the water. Varying temperature then means a varying size in all bodies.

To have a change of temperature it is of course necessary that heat should pass from one body another. This can be done in three ways. These are called conduction, convection and radiation. When heat is transmitted by what is called conduction it passes from particle to particle of matter. Each particle, we may suppose, as it receives more of that kind of motion, which we call heat, increases the motion of its neighbor. When heat passes through a body of any kind by conduction, each particle of matter on its way is heated. The rate at which heat passes in this way is different for different bodies. Through silver heat passes fastest by conduction. Hence we say that silver is the best of all conductors of heat. Copper has a conducting power 81 per cent. as great as that of silver. Zinc is another very good conductor, its conducting power being about 64 per cent. of that of silver.

Through air, gases and liquids heat cannot pass by conduction, or, at least, it passes in so small a degree that it is quite inappreciable. In other words, heat does not pass from one particle of a liquid or gas to another. There are a great many proofs of this, one of which is that either or any similar substance may be burned upon the surface of water, and although a great heat is produced, it will not affect a thermometer placed a fraction of an inch below the surface. Heat is readily communicated from solids to liquids and liquids to solids. When a particle of a liquid is heated by coming in contact with some hot solid, as, for example, the bottom of a dish in which it is suspended over a fire, being expanded by the heat, the colder and heavier particles around it press it upward toward the surface and themselves come in contact with the hot bottom of the dish. In this way the whole body of liquid or gas contained in a vessel is heated. This method of transmitting heat

is called "convection." When we consider this it becomes easy to understand why it is impossible to heat all of a liquid or gas contained in a vessel or a room where there is no circulation. To become heated the circulation is necessary; every particle must in turn obtain its heat from a solid body, as the heat cannot pass from one particle to another. This accounts for a fact which has surprised many—that from some forms of steam boiler cold water can be drawn from the water legs while the boiler is making steam freely, with the furnaces going full blast.

The third method by which heat may pass from one body to another is called "radiation." Heat radiated does not pass from one particle of a body to another, but goes through air or vacuum, or in some cases through solid bodies, with a very different velocity from that with which it is conducted. Radiant heat does not heat the body through which it passes. Thus the heat of the sun may be felt even when it passes through a pane of glass covered with frost. Many of our readers will call to mind Dr. Kane's experiment of a burning lens made from ice. In this case the heat rays from the sun were brought to a focus by passing through the ice lens, which was not melted. Most gases allow radiant heat to pass easily. When open fires were used for heating, it was radiant heat chiefly that warmed the rooms. This left the air comparatively cool; in fact, the air was not warmed at all, save as it came in contact with the walls of the room or objects in it. One of the peculiar advantages of the old-fashioned fireplace was in the coolness of the air as compared with objects in the room.

From the foregoing, it will be seen that when we speak of heat and cold, we must understand what we mean, or are very apt to fall into error and confuse ourselves as well as others. Heat and cold, as we have said, are not substances but conditions. When we say a thing is hot, we mean that there exists within it a certain kind of motion—a more or less violent rocking of its molecules which increases in violence with the elevation of the temperature, until the molecules roll over, when we have fusion. When we say a thing is cold, we mean that the molecular motion of which we have spoken has become so gentle as to be imperceptible to our senses

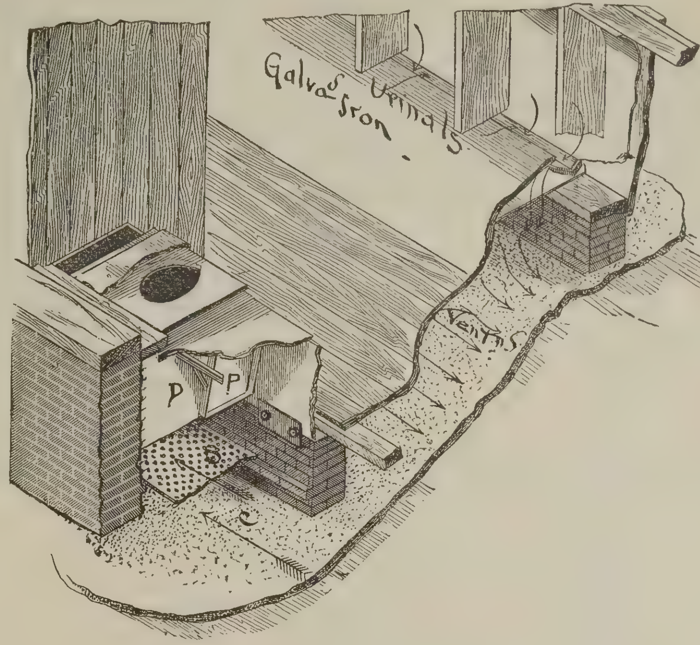


Fig. 2.—Sectional View of Parts Shown in Fig. 1.

—or, in the supposable case of a substance wholly devoid of heat, has ceased altogether.

The Ross Sanitary Closet.

In the accompanying illustrations we show several views of a crematory and closet combined, which is being placed upon the market by the Fuller & Warren Company, of Chicago, Ill. Fig. 1 of the engravings represents a rear and end view of the closet; Fig. 2 shows a sectional view, while Fig. 3 represents a cross section through the closet and urinal. The closet proper consists of a brick apartment, 20 feet long, 3½ feet high upon the inside and 2 feet wide. It is designed for 10 seats. In the construction of the closet a perforated false bottom or screen is placed about 1 foot from the bottom of the pit, upon which the excrement falls, the solid matter being held by the screen while the liquid is allowed to flow into the pit. At one end of this pit is a small-sized furnace, while the other end communicates with the ventilating flue. Brick forms the framework of the structure, while the rest is made of light boiler iron. This is covered with mineral wool, on top of which is used a coating of asbestos. The seats are lined with bright tin, for the purpose of reflecting the heat from the surface. A galvanized drip-pan is so placed that when the refuse in the pit is being consumed by fire, it may be pulled over the lids. This arrangement gives an air space between the linings of the cover and the iron pan referred to, and greatly reduces the danger from fire. When a quantity of refuse has collected upon the perforated bottom or screen above referred to, a shovelful of pine sawdust, soaked with kerosene oil, is thrown into the pit and set on fire. By the construction employed the flame sweeps through the whole length of the closet, burning the entire contents and leaving nothing but a few ashes. The claim that these closets occupy about the same space as ordinary water-closets, and that where constructed in basements, the foundation is a bed of cement, the walls of the pit being of brick laid in cement. Both bottom and sides are then coated with a preparation, which, it is claimed, renders them fire-proof and water-tight. Contracts have been executed for several closets in school buildings, the one in the Garrison school-house at Rockford, Ill., which has been in use for some time, giving very satisfactory results. The company are at present introducing their system into public and private institutions in various parts of the country,

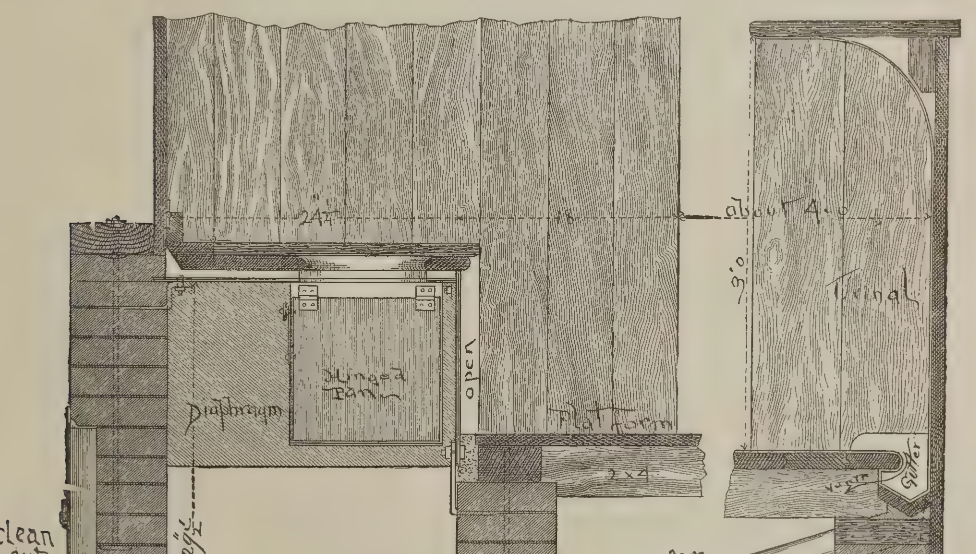


Fig. 3.—Cross Section through Closet and Urinal.

and, while specially intended for structures of this class, it is equally applicable, it is claimed, for use in private dwellings.

Specification for Hot-Air Heating.

Weatherly & Pulte, of Grand Rapids, Mich., a short time since prepared a blank proposal and specification for hot-air heating and ventilation, which they have found very convenient for use in their business. As being likely to be of interest to our readers we submit the same for their consideration in this connection. It is as follows:

Proposal and Specification for Hot-Air Heating.

M...

The undersigned contractors propose to furnish complete a number.......................
....
....
....
....

This will be set up in manner designed, in basement, with smoke-pipe connection to chimney. Said smoke-pipe to have a suitable damper.

BRICKWORK. All necessary brickwork shall be constructed of first-quality brick, neatly laid, with rubbed joints, the contractor providing all necessary bars, stays and castings.

In furnace setting, suitable and safe provision will be made for attaching fresh-air duct, hereafter mentioned.

Hot-air pipes, made from IX bright tin, with suitable curves, will be extended from furnace to all rooms herein mentioned.

Partition pipes will have Asbestos paper (fire-proof) placed between same and woodwork.

The following named rooms will be warmed, and have pipes and registers of size and kind named, viz.:

Rooms.	Size of Pipe.	Size of Register.	Finish of Register.	Temperature Guaranteed.
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......
....	......	......	......	......

Ventilation.

Rooms.	Size of Pipe.	Size of Register.	Finish of Register.
....	......	......	......
....	......	......	......
....	......	......	......
....	......	......	......
....	......	......	......
....	......	......	......
....	......	......	......
....	......	......	......

The location of furnace, pipes, registers, air duct, &c., shall be fixed by contractor, in such manner as will secure best results in warming.

All hot-air pipes will be provided with dampers, placed in same near the furnace, for the purpose of shutting off the air delivery in rooms not used and properly proportioning the flow in others.

An air duct, made of matched flooring, provided with slide or hinge, damper will connect furnace with outside air supply.

The intent of this specification is to provide and put in place all material and labor necessary for a complete heating apparatus.

The owner, on his part, agrees to..........
....
....
....
....

All other material or labor necessary for proper completion will be furnished by contractors.

Guarantee.

The owner, on his part, using due diligence in following instructions furnished for care of apparatus, the contractors guarantee a furnace of sufficient capacity to do the duty required, size of pipes, registers, &c., and arrangement of same, such as will secure temperatures named when 10° below zero outside.

Should these conditions not be obtained the contractor will, at his own expense, make such changes or additions as will secure said results.

Consideration:..............................
....

TERMS OF PAYMENT.—One-half of contract price on delivery of material and setting of furnace proper; balance, 60 days after said setting, unless otherwise agreed.
....
....
....

WEATHERLY, PULTE & CO.

Using Glue.

In a recent issue the *Scientific American* presents the following directions with reference to the use of glue:

For glue to be properly effective it requires to penetrate the pores of the wood; and the more a body of glue penetrates the wood the more substantial the joint will remain. Glues that take the longest to dry are to be preferred to those that dry quickly, the slow drying being always the stronger, other things being equal. For general use no method gives such good results as the following: Break the glue up small, put it into an iron kettle, cover the glue with water, and allow it to soak 12 hours. After soaking boil until done. Then pour it into an air-tight box, leave the cover off until cold, then cover up tight. As glue is required cut out a portion and melt in the usual way. Expose no more of the made glue to the atmosphere for any length of time than is necessary, as the atmosphere is very destructive to made glue. Never heat made glue in a pot that is subject to the direct heat of the fire or of a lamp. All such methods of heating glue cannot be condemned in terms too severe. Do not use thick glue for joints or veneering. In all cases work it well into the wood in a similar manner to what painters do with paint. Glue both surfaces of your work, except in cases of veneering. Never glue hot wood, as the hot wood will absorb all the water in the glue too suddenly and leave only a very little residue.

THE GURNEY HOT WATER HEATER COMPANY, 237 Franklin street, Boston, Mass., who claim to be the pioneers in the hot-water heating business, and have done so much to introduce this system in this country, inform us that they have upward of 3000 Gurney heaters in use in the United States and Canada, and that all of them are giving the most satisfactory results. According to the construction of this heater, the water is coolest at the base just above the line of the ash-pit. At this point bricks are introduced, cutting off a certain portion of the water surface, so that the heat is not abstracted from the fire sufficiently to make it burn dully. By this arrangement perfect combustion is said to be secured. The grate of this heater is made to roll on balls, and it is claimed that even when loaded to the fullest extent friction is so small that by the use of a lever a child can easily shake the grate of the largest furnace made. The products of combustion rising from the fireplace impinge directly against the bottom surface of the first section above; passing upward, they again strike the bottom surface to the next section, above which there is a little room left for the expansion of the gases. The products of combustion before entering the exit-pipe strike successively five bottom surfaces. The heater is made so that it can be easily cleaned, and while the grate is being shaken all the doors remain closed, so that the dust is entirely confined to the ash-pit.

A FEATURE of the display made at the Ohio Valley Centennial Exposition by the Cincinnati Corrugating Company, of Cincinnati, is a building measuring about 10 x 18 feet in size, by means of which the company show in a practical way the various applications of their products. The lines include iron roofing, siding, ceilings, &c., and the display indicates many of the ways in which the material may be employed in connection with buildings. The company have prepared for distribution what they are pleased to call a "Centennial Card," upon one side of which appears advertising matter relating to their product, while the opposite presents a scene from Western frontier life. It is a picture made famous as the Arkansas Traveler. The settler is seated upon a barrel beside the door of his log cabin, playing the violin. About him are grouped his interesting family, whose attention is attracted toward the traveler approaching the cabin on horseback. Reaching the abode of the settler he halts, and pointing to the roof of the cabin, which is in a sadly dilapidated condition, asks, "Why don't you put a new roof on your house?" The answer, which reminds us of the reply of the Irishman when propounding a similar conundrum, is, "'Cause, when it's raining I can't, and when it ain't raining it don't need any."

WE ARE INDEBTED to M. Mahony, Troy, N. Y., for an illustrated catalogue of the Mahony hot-water heater. The pamphlet is neatly gotten up, contains some 40 pages, and gives full descriptions with numerous illustrations of the Mahony apparatus. The preface directs attention to the increase in favor of this method of heating, and is followed by brief descriptions of the system. The subject of boilers is next taken up, special reference being made to the Mahony, after which there is a section entitled "General Directions," in which boiler piping, radiating surface, expansion tank, valves and water supply are briefly treated of. The Mahony boiler, illustrated by general and sectional views, is followed by a full description of the special parts of the heater, including the Mahony rocker grate. Some valuable tables occupy a few pages of the pamphlet, and further on we come to floor plans and elevations of buildings, showing methods of heating by hot-water circulation. The last pages of the publication are devoted to illustrations and brief descriptions of several well-known radiators. The Mahony hot-water heater, which is made of cast iron, is of the magazine type, and among the several advantages claimed for it are that it has no packed joints, requires no brickwork, has no flues to clean, has no brick lining, is efficient, cheap and safe.

THE LARGE BUILDING, No. 16 Mott street, New York City, is to be torn down by the New York Chinese municipality, who will build there a regular headquarters for Chinamen in real Oriental style. Much of the mason and carpenter work will be done by Chinese mechanics. The building will cost over $25,000, and will be the first piece of Chinese architecture in the city.

WALL SHELVES IN TURNED AND FRETTED WORK.

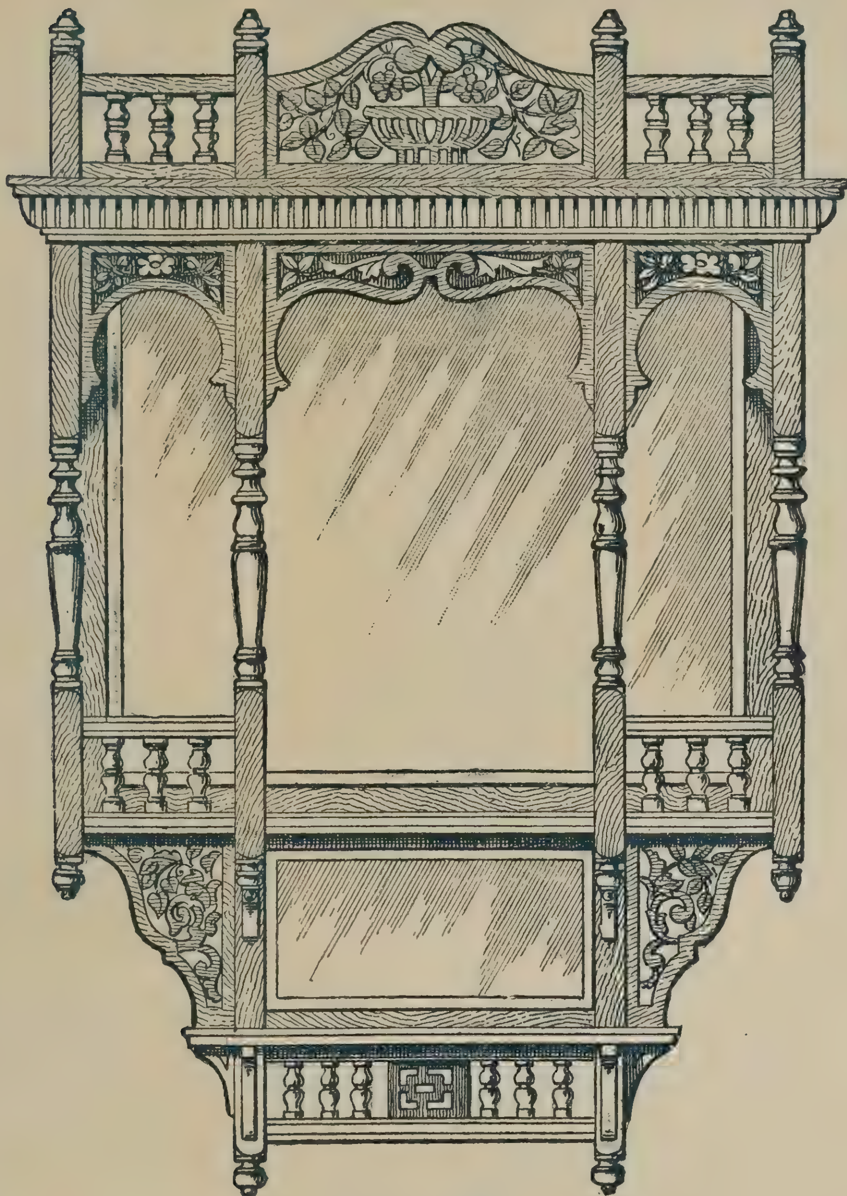


Fig. 1.—Front Elevation.

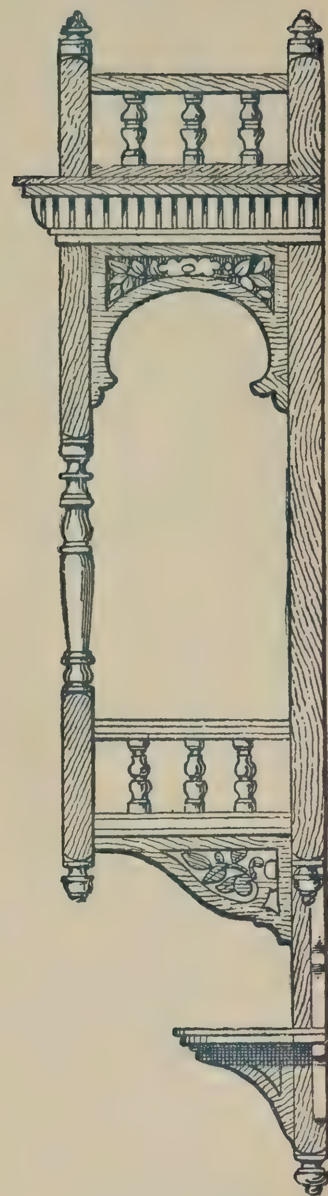


Fig. 2.—Side Elevation.

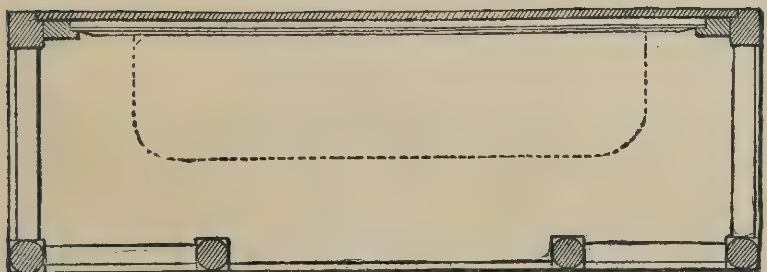


Fig. 3.—PLAN. Scale of Plan and Elevations 2 inches to the foot.

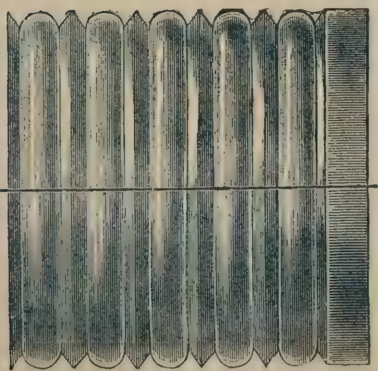


Fig. 4.—Turned Enrichment for the Cornice. Full size.

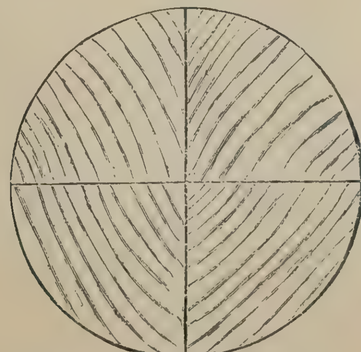


Fig. 5.—Section of preceding, showing the Sawing.

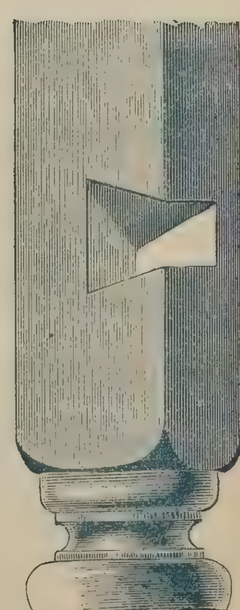


Fig. 6.—Dovetail in End Post to take corner of Shelf.

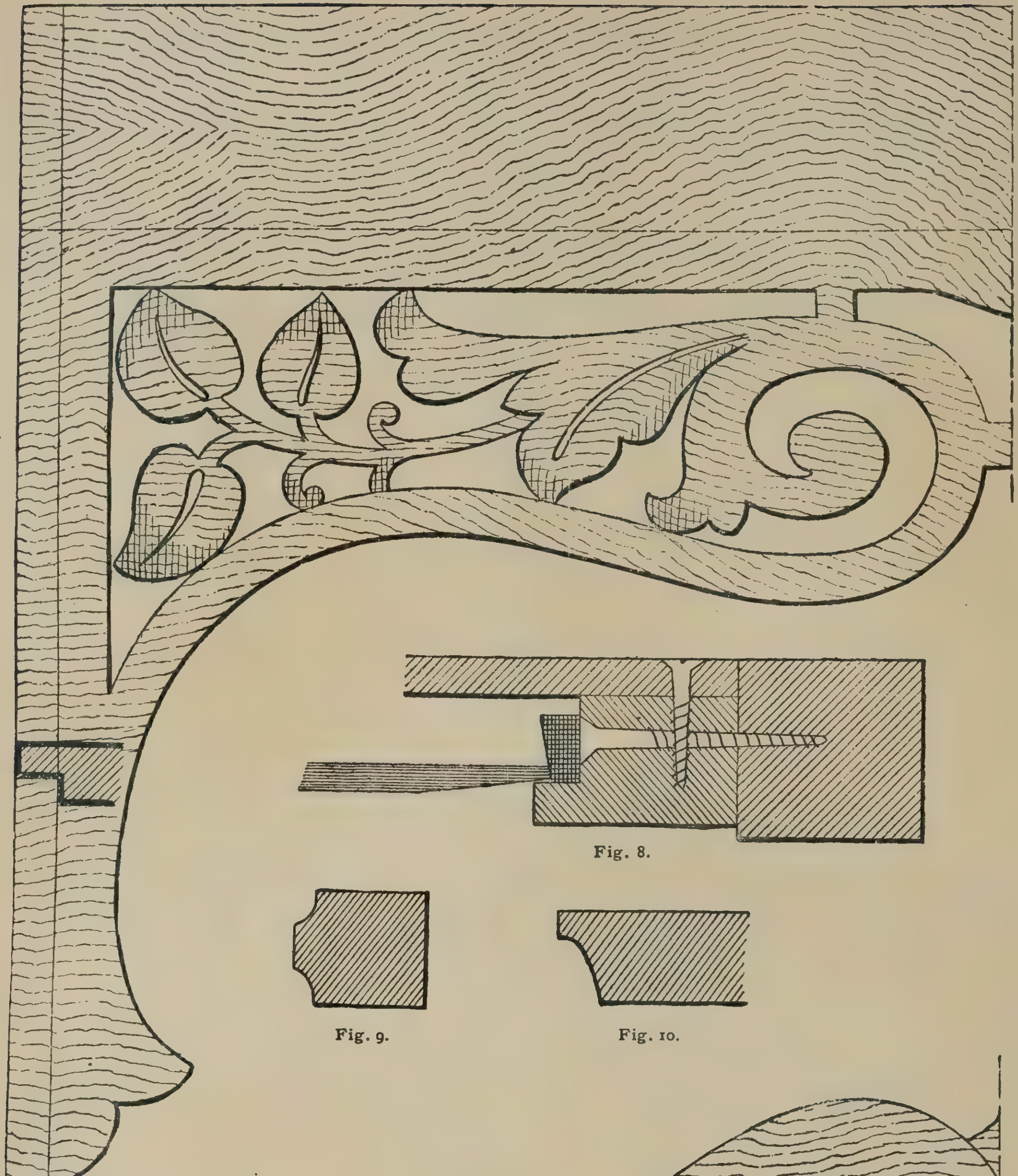


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 7.

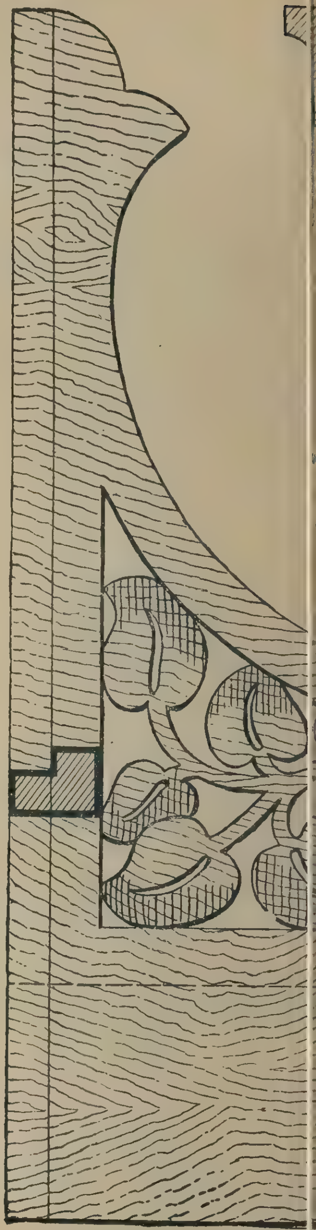


Fig. 12.

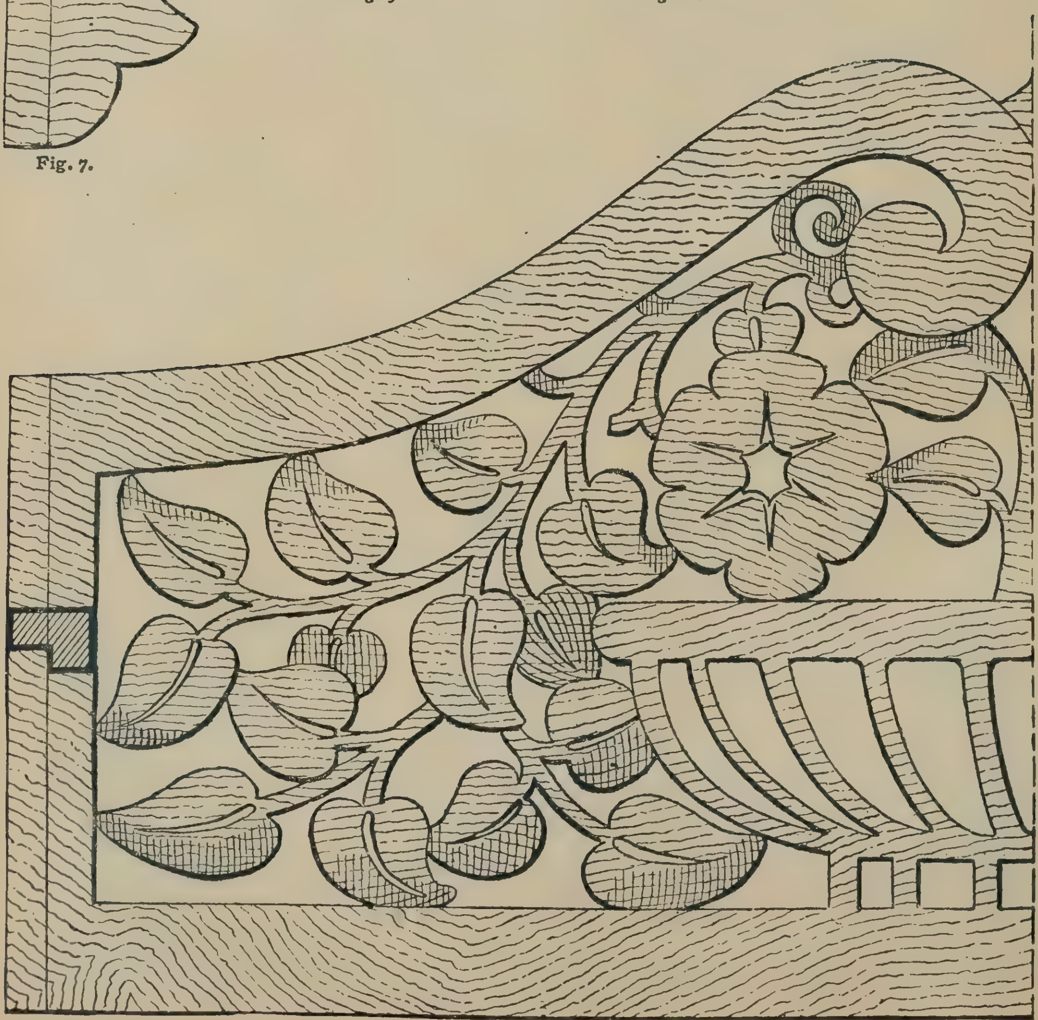


Fig. 11.

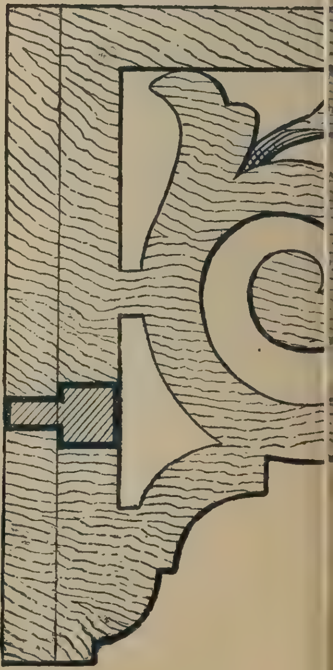


Fig. 15.

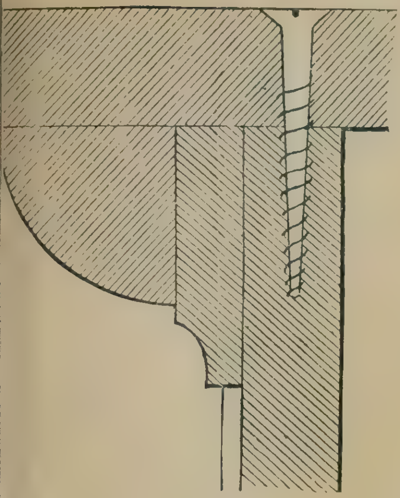


Fig. 13.

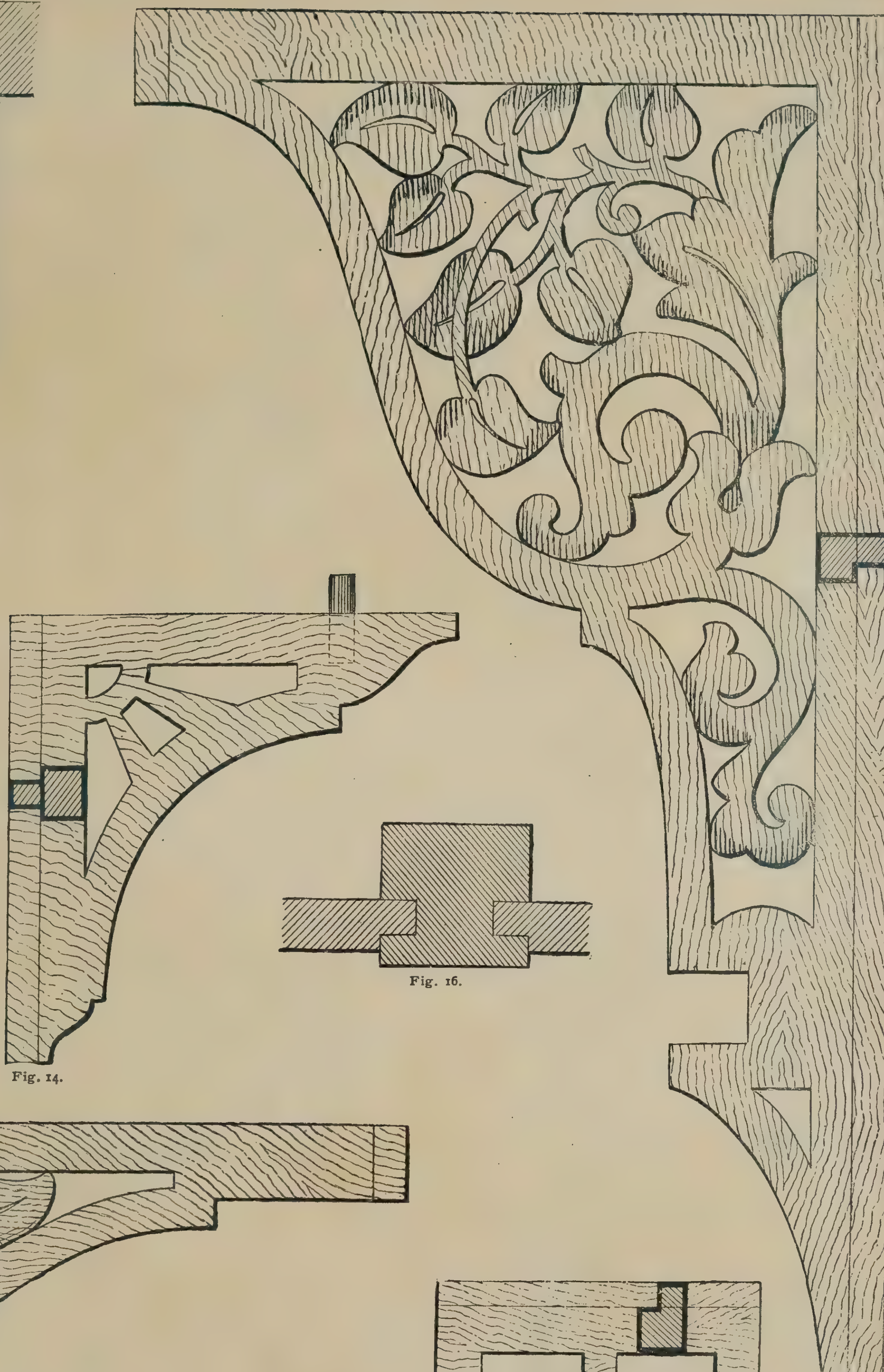
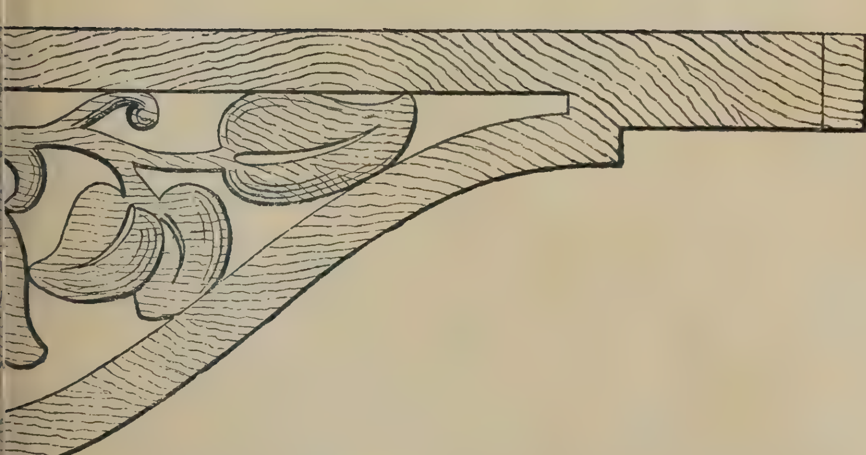


Fig. 14.

Fig. 16.

Fig. 17.



Details of Sawn or Fret Work for Wall Shelves.

FULL SIZE.

For Elevations, see preceding plates. For Description, see page 183.

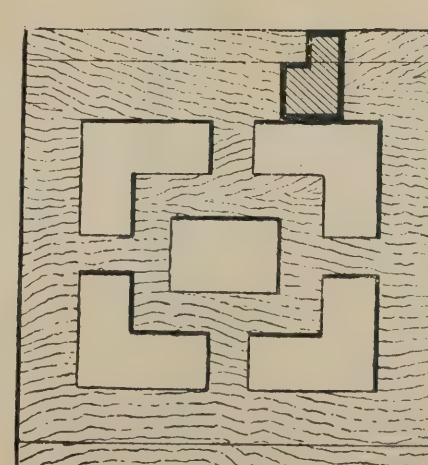


Fig. 18.

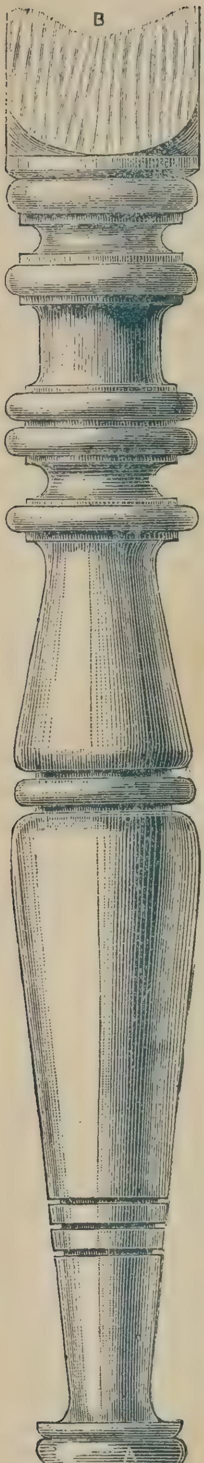


Fig. 19.—Central Portion of Pillar.

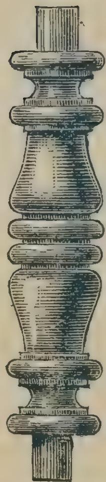


Fig. 21.—Small Spindle.

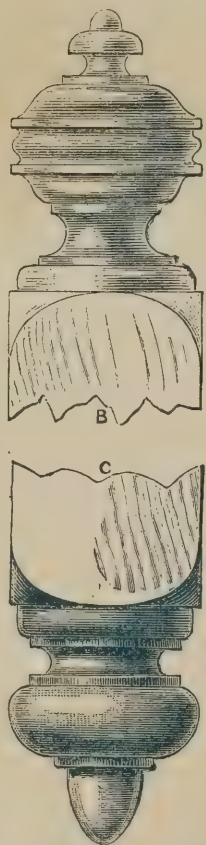


Fig. 22.—Top and Bottom of Pillar.

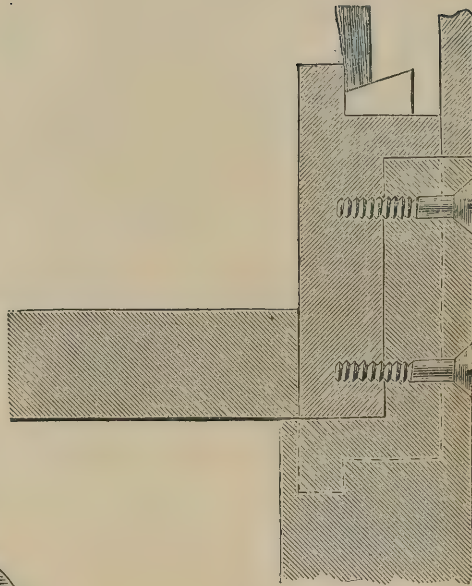


Fig. 24.—Connection of Short Post and Lower Rail.

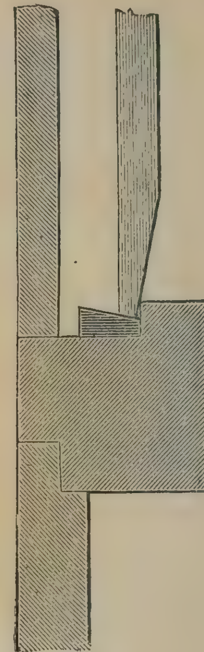


Fig. 25.—Checking Short Post for Side Brackets and Glass.

Fig. 26.—Shelf cut to fit Front Posts.

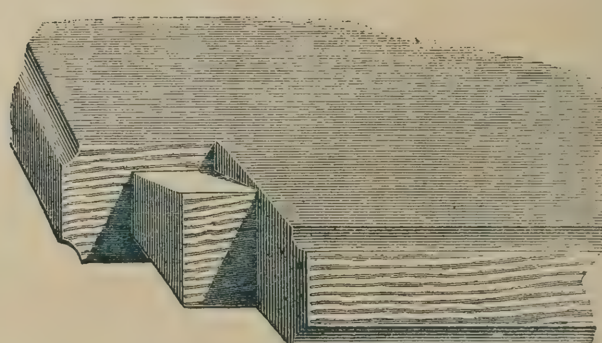


Fig. 27.—Corner of Shelf to fit End Post.

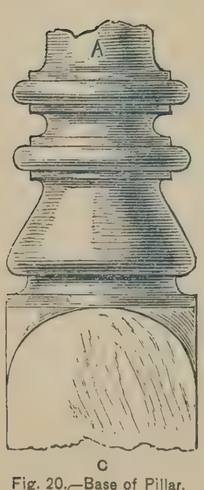


Fig. 20.—Base of Pillar.

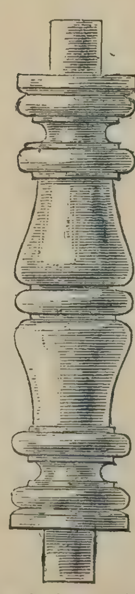


Fig. 23.—Large Spindle.

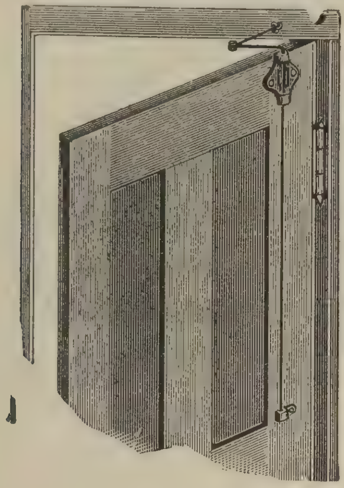
Fig. 28.—Cutting Back Edges of Narrow Shelf.

DETAILS OF WALL SHELVES—FULL SIZE.

NOVELTIES.

The Peabody Door Spring.

The accompanying illustration represents the Peabody Door Spring, manufactured by A. W. Paine, Peabody, Mass.,



Novelties.—Fig. 1.—The Peabody Door Spring.

showing it in use attached to the door. The spring is described as consisting of Bessemer-steel spring wire 3 feet long. At one end a right angle is turned, with an arm 5½ inches, to the end of which another piece of wire, 5 inches, is connected by a rivet, which forms a hinge. On the free end of this piece a hook is turned which fastens into a screw eye in the casing over the door ½ inch from the angle in the spring. As indicated in Fig. 1 the spring is placed on the door parallel with the hinges and about 3 inches from the same. The spring is so placed that the arm works freely over the top of the door. The requisite power for closing the door is obtained from the torsion of the wire, which is got by turning the wire round in the socket toward the hinges as far as is desirable and placing the wedge in the socket, when, bringing the arm around and hooking it into the eye, the spring is ready for use. It is explained that the leverage obtained by the arm of the spring is greater at the latch than at any other point, so that the door is closed slowly until it is nearly shut, thus avoiding to a great extent the slamming of the door. The advantage of this article over other low-priced springs is thus alluded to. The spring is referred to as desirable for screen doors, as it can be very easily unhooked and the door put away. Its adaptation for other doors is also referred to.

Iron Fencing.

The design of iron fencing shown in Fig. 2 is a selection from a new catalogue issued by J. E. Bolles & Co., of Detroit, Mich. It represents one of several styles of iron fence, with a patent rail fastening, which they are manufacturing. The special feature of the fence is the bottom rail. This is 1½ inches by 1¼ inches in dimensions, of U-shaped steel. The pickets have a double bearing in this rail, passing through both flange and fastening in such a manner as to render the whole construction very rigid. It is claimed that by this construction a stronger fence is produced than by any other in use, when size and weight are considered. Line posts are omitted, as none are found necessary. The panels are supplied in 6-foot lengths and are connected with malleable iron clamps, with a cast-iron foundation, and braced at each intersection of panels. The result is a fence of uniform appearance pleasing to the eye and at the same time of the greatest possible strength. Line posts, while generally omitted, as mentioned above, are supplied where desired. The catalogue before us contains a number of designs, all embodying the special features of construction we have referred to.

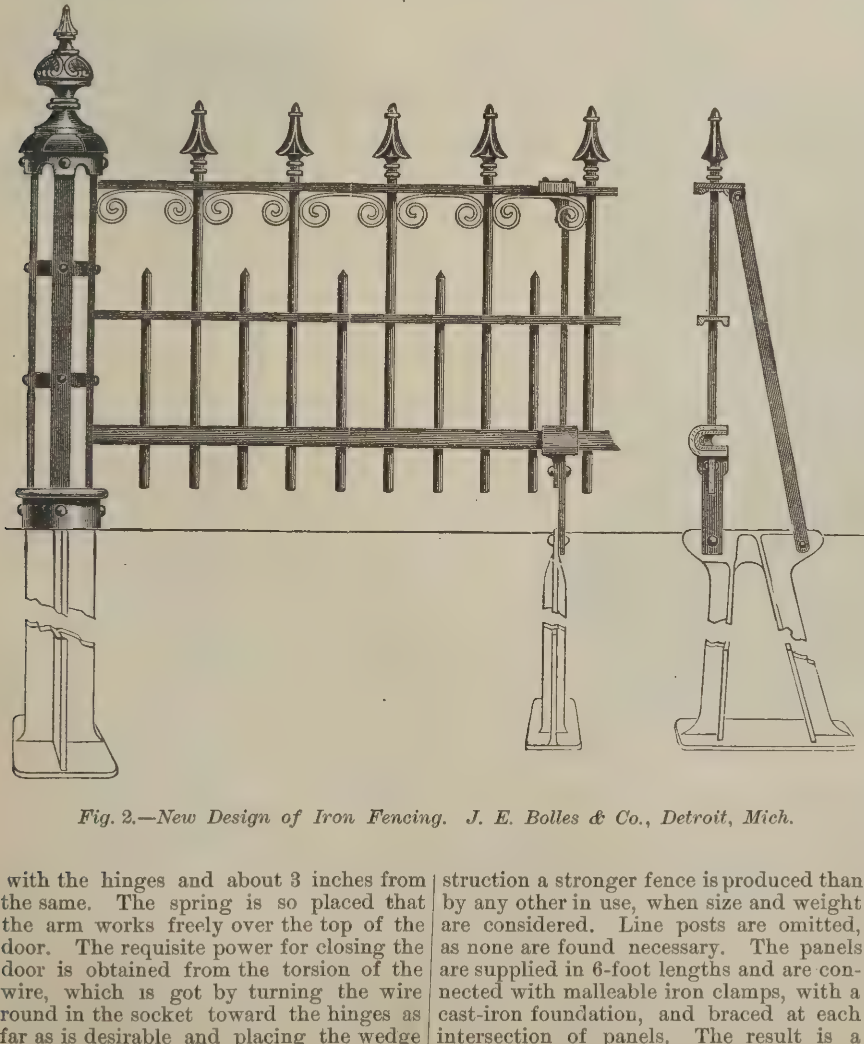


Fig. 2.—New Design of Iron Fencing. J. E. Bolles & Co., Detroit, Mich.

Humphrey's Woodworkers' Knife.

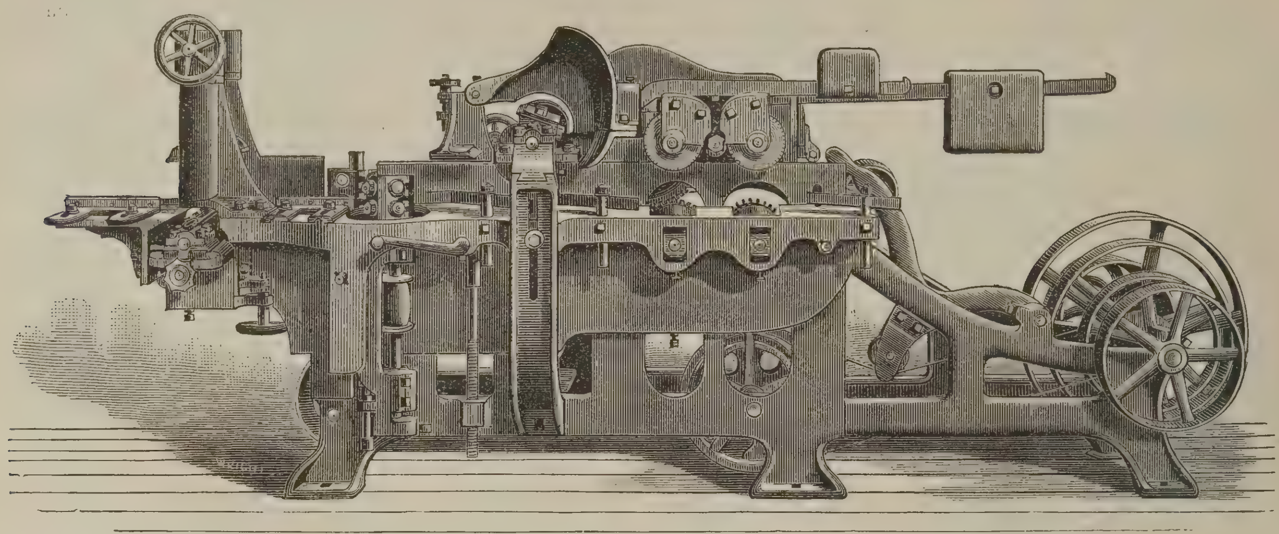
By means of the engraving Fig. 3 we lay before our readers a very convenient tool, which is being offered the trade by the Humphrey Tool Company, of Warren, Mass. The manufacturers state that while this knife, by reason of its shape and construction, is peculiarly adapted for use by woodworkers, it will be found very convenient and useful in many other lines of trade. The handle of the knife is made of hardwood and tipped with brass, which renders it very strong and durable. It is smoothly finished and of such shape and size as to easily fit the hand of the operator The blade, which is 6 inches long, is made of the best quality cast steel, carefully tempered and tested. It is V-shaped in cross section and fits an opening of corresponding shape in the end of the handle. A set-screw, not shown in the engraving, is placed in one end of the handle, and when the blade is in position forces it firmly into the bottom of the opening in the handle; by this means any length of blade desired may be secured. The construction is such that when the knife is not in use the blade may be reversed in the handle, which protects the edge and tends to keep it sharp. Two widths of blade are made—viz., $\frac{7}{16}$ and $\frac{9}{16}$ inch. In the engraving presented herewith the blade and handle are shown apart.

Fig. 3.—Humphrey's Wood-Worker's Knife. Handle and Blade apart.

Four Headed Molding Machine.

Levi Houston, of Montgomery, Lycoming County, Pa., is directing the attention of the trade to a new 10-inch four-headed molding-machine which he is introducing, a cut of which is shown in Fig. 4. Mr. Houston informs us that this represents improved construction, gotten up specially to supply the wants of car shops and large molding establishments. He asserts that the machine is capable of working any moldings not exceeding 10 inches in width and 5 inches deep, and that it will also dress common four-sided planking and sheeting. Planing and matching can be done up to 10 inches wide. The table is securely gibbed to the middle of the frame and at the rear end, near the cutter. It is also clamped to the frame at the front end. The under cutter has horizontal and vertical adjustments, and is provided with a very heavy and substantial pressure bar, independent of the frame. The inside and outside headstocks are also adjustable. The top headstock has a lateral adjustment, and is provided with Houston's improved outside bearing. The feeding mechanism is of improved construction, consisting of four 6-inch rolls. The upper rolls are fluted and heavily weighted, and are hung in such a manner that they rise parallel with the bed, thus giving them an equal bearing the full width of the lumber. All

four rolls are driven with a continuous train of gears, making, it is claimed, the most powerful feed yet applied to any wood-working machine. The heads are made of cast steel, four-sided and four-slotted. Four rates of speed are provided—namely, 22, 30, 36 and 52 feet per minute.



Novelties.—Fig. 4.—Four-Headed Molding Machine. Levi Houston, Montgomery, Pa.

Combination Saw Bench.

The engraving, Fig. 5, represents the Combination Saw Bench, just brought out by Frank H. Clement, 131 Mill street, Rochester, N. Y. In the catalogue the device is described as a new and fine design for a general cutting-off and splitting saw bench, a combination machine for pattern-makers and carpenters, also for chair, wagon, furniture, car and job shops and in all places where accurate work is required. The frame is cored out and cast in one piece and is heavy and rigid. The table is iron and rises and falls in a direct line on gibbed slides. It is controlled by a large hand wheel and screw. The table is also made to tilt forward from the right-hand side to an angle of 45°. Iron cut-off and iron splitting gauges are provided. The former can be adjusted to 45° in either direction and may also be used on either or both sides of the saw. Jointing, dadoing, grooving, rabbeting and molding heads may be used, and the large iron throat plate in the center can be removed instantly to facilitate changing heads or saws. Wooden throat plates may be used as desired. The maker informs us that all parts are nicely adjusted, true and secure, so that fine jointing can be done without subsequent hand fitting. The arbor is provided with self-oiling boxes, carefully screwed to the journal, and provision is made for taking up end motion. In driving the machine the countershaft is usually attached to the floor 4 or 5 feet from the machine. It may be located below the floor. Either of these positions is deemed more satisfactory in use than attaching it to the frame of the machine.

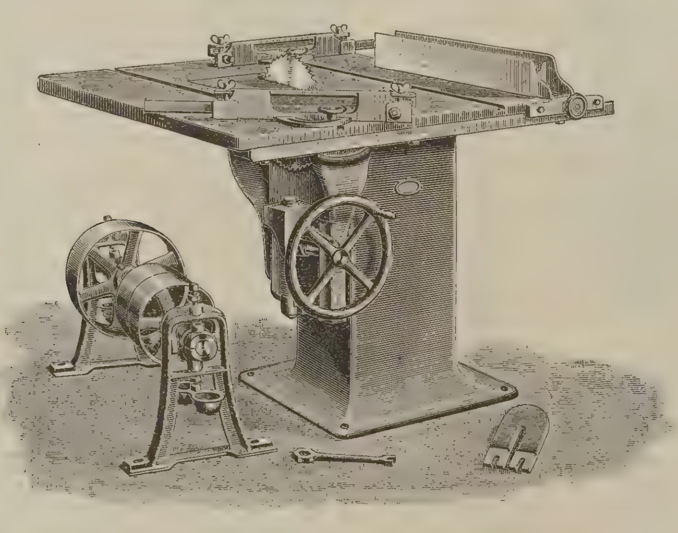


Fig. 5.—New Combination Saw Bench. Frank H. Clement, Rochester, N. Y.

Combination Planing and Sand-Papering Machine.

The Egan Company, of Cincinnati, Ohio, have brought out a combined planing and sand-papering machine designed for finishing doors, large panel work, &c., a general view of which is afforded by means of the engraving presented herewith. The machine is provided with a cutting cylinder in connection with a sanding drum working the full width of the machine. The advantage claimed by the manufacturers of a machine of this description is that the cutter-head takes off the irregularities in the surface of a door or large panel, and prepares it for the sand-drum, the resulting product being a very smooth surface. The frame of this machine is made wholly of iron, and is fitted with the necessary adjustable throat plates, both before and after the cutter-head. A feature of the arrangement of parts consists in the position of the front plate, which may be let down to allow of any amount of cut desired. The cutter-head is so constructed, it is claimed, as to give a shear cut, which insures smooth work when cutting with or across th-grain. The sanding-drum is providee with a patent brush attachment, and id belted independent of the cutter-heads When desired, the machine may b. converted into a double drum sander be simply removing the cutter head and suby

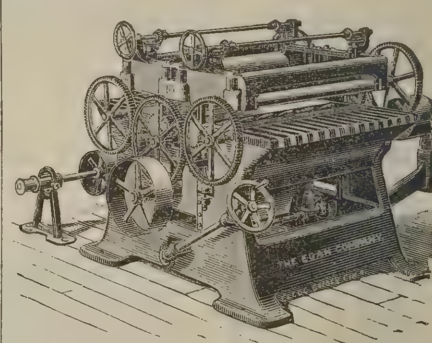


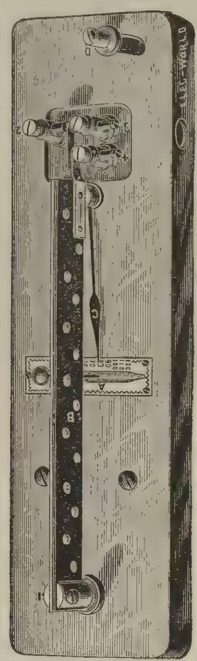
Fig. 6.—Combination Planing and Sand-Papering Machine. Made by the Egan Co., Cincinnati.

stituting a sand drum. This may be accomplished without disarranging the machine and is claimed to be an advantage over other constructions designed to effect the same results. The feed is said to be very powerful, consisting of eight steel feed rolls of large diameter, and all heavily geared by a patent system of gearing, which is claimed to insure a strong and at the same time reliable feed, a feature which must characterize all power-feed sand-papering machines. The rolls are said to be adjustable at will, while one hand wheel at the front or working end of the machine regulates the cut of either the cylinder or sand drum. The sand-paper may be readily inserted by simply removing the end of the board and lowering the end girth, which is hinged for the purpose. The machine is carefully made in all its parts and is of the same general design as the company's large double drum sand-papering machines.

The Butz Heat Regulator.

Temperature regulation, like ventilation, is among the first and most important considerations, not only in hospitals, churches and schoolhouses, but in private dwellings. In this climate the severe winters, together

with the rapid changes in temperature, make some device by which a uniform temperature can be maintained within doors of the greatest importance, and electricity is eminently adapted to perform the office of heat regulation. For this purpose the well-known thermostat (with



Novelties.—Fig. 7.—The Butz Heat Regulator Thermostat.

such improvements as have been recently made) is employed in combination with other devices which operate to effect the regulation according to its indication.

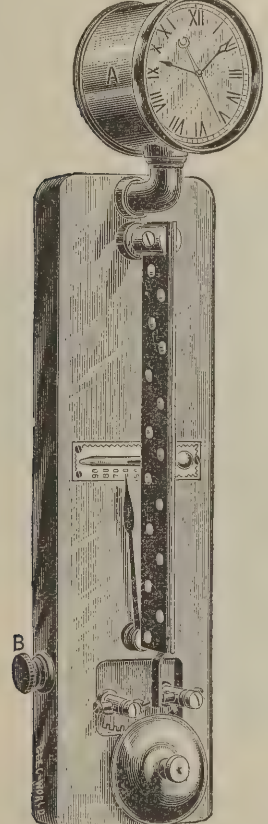


Fig. 8.—Automatic Switch Thermostat.

A system of this nature was recently devised by Mr. A. M. Butz, of A. M. Butz & Co., 154 Lake street, Chicago, and is being now introduced in Boston, New York, Chicago and Minneapolis. This system can be applied to any form of heating device, whether steam, hot water or hot air. It can be applied to the heat source in each room, as on the radiator, register or stove, or to the drafts of the heater or furnace, wherever it may be located, either in the basement or in the barn.

The apparatus consists of a thermostat, Fig. 7, located in the reception hall or sitting-room, which by the influence of the temperature closes an opening and a closing electric circuit at the change of 1°. A motor, Fig. 10, is located in the furnace-room, having sufficient power to open and close a set of balanced dampers, or front and check drafts. There is also a battery, consisting of three cells of sufficient energy, it is said, to run the regulating device for three years without attention or renewal. A bell placed in the servant's room and wires to connect completes the system. As it is desirable in residences to have 5° or 10° lower temperature at night than in the day time, Mr. Butz has patented an automatic switch thermostat, as illustrated in Fig. 8. Before retiring it is determined at what degree the temperature should be set for the night by an adjusting screw, and at what time in the morning it is desired to have the temperature raised to the day temperature by turning alarm hand on the clock to, say, five or six o'clock, at which time it will automatically switch the thermostat from 60° to 70° or any other intermediate degree.

When applied to a steam, hot-water or hot-air heater, the motor is fastened to the furnace and a chain attached to the crank of the motor raises the front draft and closes the check draft, when the temperature falls ½° below the desired point in the room above, and immediately reverses the drafts when the temperature exceeds the desired degree where the thermostat is located. When the temperature falls 2° or 3° below the desired degree, a third circuit is closed on the thermostat on which the bell is located, and this will alarm the attendant to supply coal or shake the ashes down. In Fig. 9 is shown the thermo-electric valve for steam radiators which will be at once appreciated by steam users, as no expensive pneumatic appliances are needed for its operation. Three electric wires and two cells of battery in combination with the thermostat is all that is required to shut off or turn on steam for direct or indirect radiation, and, it is claimed, obtain perfect regulation of temperature in residences, public buildings, hospitals, schoolhouses and conservatories.

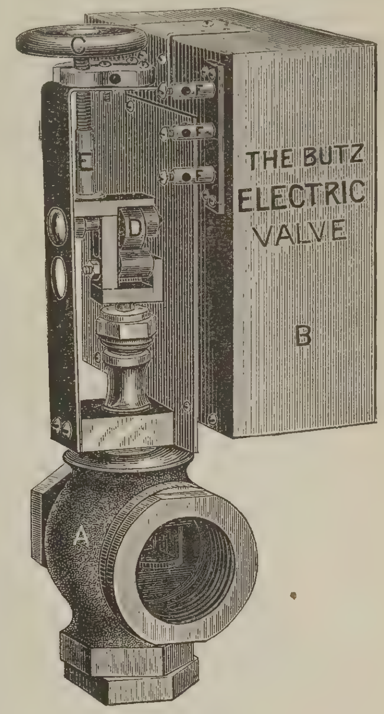


Fig. 9.—Thermo-Electric Valve.

As will be seen in Fig. 9, the valve A can be used as an angle or straight-way valve. The steam enters the chamber surrounding the core in which the double valve seats are held closed by the valve stem E and eccentric D. The upper seat being necessarily a little larger than the lower, the steam pressure helps to hold it the more firmly. When the temperature falls, the "opening circuit" on the thermostat is closed, and the motor B revolves the shaft and eccentric D, opening the valve seats and allowing the steam and water to pass in and out freely in case the valve is used on the single-pipe system.

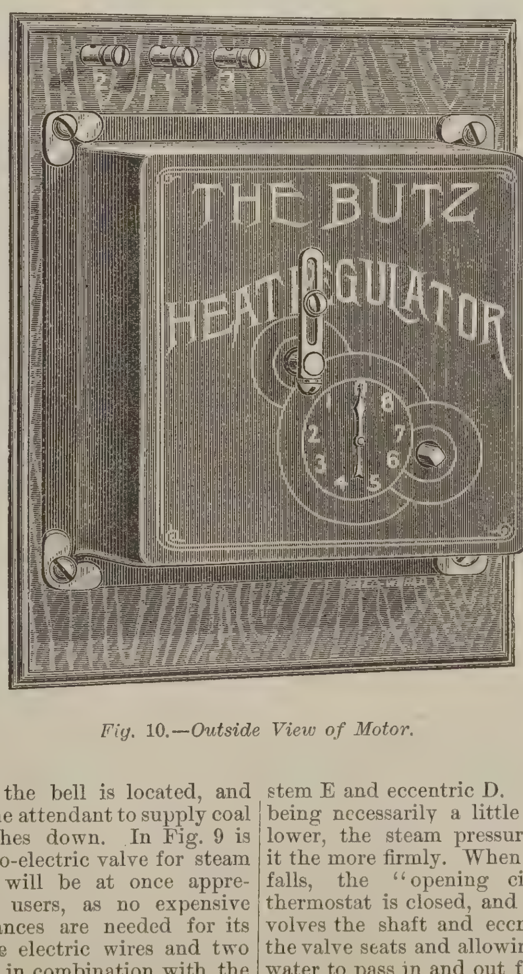
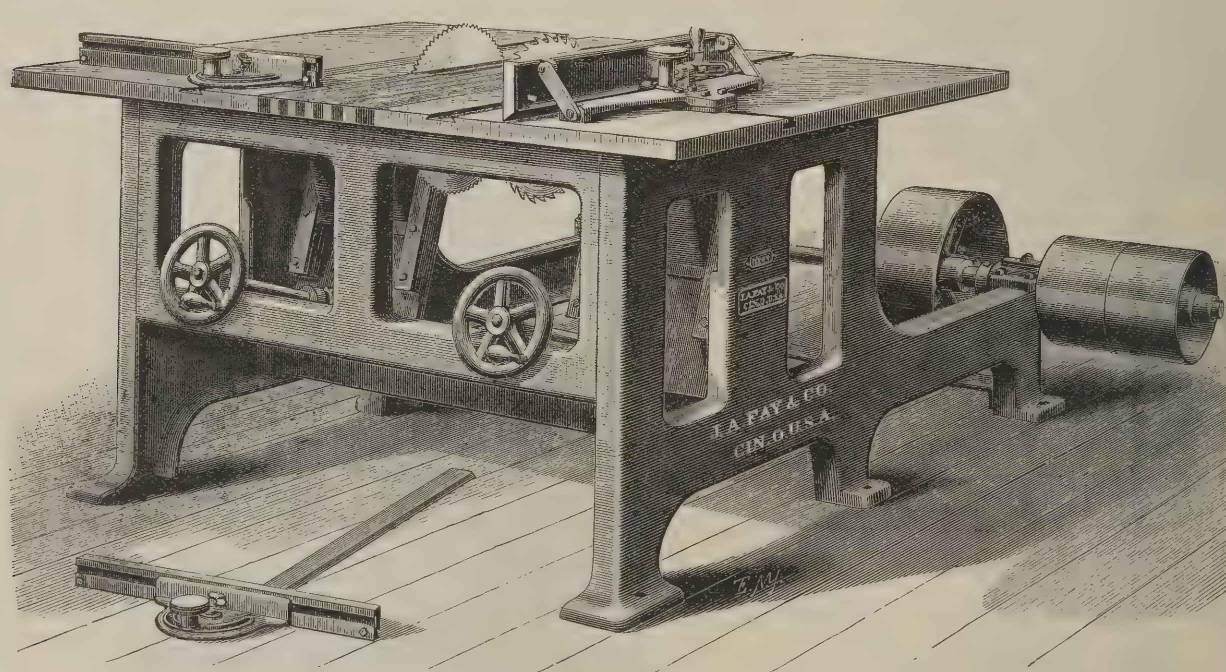


Fig. 10.—Outside View of Motor.

When the temperature rises above the desired degree and closes the "closing circuit" on the thermostat, the motor again revolves the shaft and eccentric D half a revolution, tightly closing the valve seats and shutting off the steam. Should it be required for any reason to open or close the valve without the aid of electricity, this can be done by loosening a set-screw on the eccentric D and resorting to the wheel C to raise or lower the valve stem. This system has been applied in many of the finest residences in Chicago, and a number of testimonials speak highly of its efficiency.

Double Saw Machine.

J. A. Fay & Co., of Cincinnati, Ohio, are directing the attention of the trade to a double saw machine especially adapted to the wants of cabinet-makers. The general appearance of the device is shown in Fig. 11 of the engravings. The frame is exceptionally heavy and strong, the arbors large in diameter with long bearings, each arbor and frame being adjusted independently of the other in plane gibbed ways, so arranged as to always retain the same general tension of the belt at any point to which they may be elevated. The hand wheels for use are convenient to the operator, and the table always remains at the same hight. The top is of iron, carefully planed, and measures 4 feet 2 inches by 4 feet 11 inches. It is fitted upon one side with an adjustable fence, which can be set to different angles, and is moved in planed ways to and from the saw. The other side carries a cutting-off slide, provided with stops to govern the length to be cut, which can also be set at varying angles. I slots for miter or cutting-off slides are placed close to each saw. The space between the two saws is of wood, and may be thrown back, allowing free access to the saws. Grooving, rabbeting, plowing and other heads can be used in place of either saw, which may be both rip or rip and cross-cut, according to the work required to be done.



Novelties.—Fig. 11.—Double Saw Machine.—Built by J. A. Fay & Co., Cincinnati, Ohio.

Ordway's Draft Regulator.

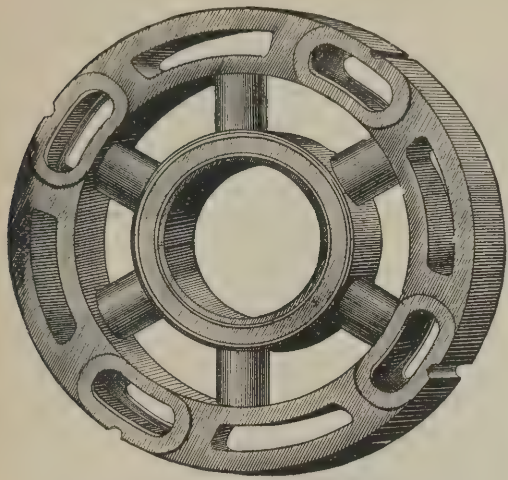
The Chicago Heating and Ventilating Company, with offices at 70 Lake street and 205 West Madison street, Chicago, have recently placed upon the market an improved draft regulator, a general view of which is shown in Fig. 12 of the illustrations. It is designed for use more especially in connection with furnaces and takes the place of the chain attachment heretofore largely employed for controlling the draft door and check valve. It may be placed in the hall or any of the rooms upon the first floor as may be most convenient. As will be seen from an inspection of the engraving, the device consists of a regulator plate, across the lower portion of which is fastened a lever. This regulator plate is made of cast iron, the two parts being fastened together by means of a screw. In order that the lever may be held in the position in which it is placed, a piece of rubber packing is inserted under the center, which tends to greatly increase the friction. At each end of the lever is a small chain which communicates, one with the draft door and the other with the check valve. These chains are of such a length as to allow of a little slack, thus preventing any possibility of either draft being opened by the strain of the chains when the lever is in a horizontal position. The figures upon the regulator plate show at a glance to what extent, if any, the draft or the check is opened. The manufacturers claim that the device is very simple in operation; that the draft door can never be opened without closing the check draft; that the latter cannot be opened without closing the draft door; that the device can be operated in the furnace room as well as in the room above; that its use prevents the escape of gases into the basement, which would result if both the draft door and check damper were opened at the same time, and that by a little experience the operator may keep the house at a uniform temperature.

Fig. 12.—Ordway's Improved Draft Regulator.

The Auburn Boiler.

We illustrate in the accompanying engravings, Figs. 13 and 14, a water ring of the Auburn boiler and Woodcock's patent shaking grate, manufactured by Woodcock & Co., Auburn, N. Y. The Auburn boiler is made entirely of cast iron and

consists of a base on which hangs the grate, the base also forming the ash pit. On the base is a fire-pot with four open-



Novelties.—Fig. 13.—Water Ring of the Auburn Boiler.

ings for the proper circulation of the water and steam to the water rings, one of which is shown in Fig. 13. The sections comprise outside and inside hollow rings, connected with hollow arms. The inside rings are set one above the other and form the coal magazine, which, it will be noted, is entirely surrounded by water, so that the coal cannot reach a higher temperature than the water in the boiler, and consequently no partial combustion can take place. In the outside rings are openings similar to those in the fire-pot for circulation, and it is also provided with return flues, by which an increased heating surface is secured. A steam dome surmounts the water rings and provides ample steam space. It also has an opening through the center into which the coal is fed and another opening through which any gas which may be generated in the magazine is conducted to the combustion chamber. The arms connecting the water rings of the sections do not come above one another, but are staggered, so that the greatest possible heating surface is obtained. The manufacturers

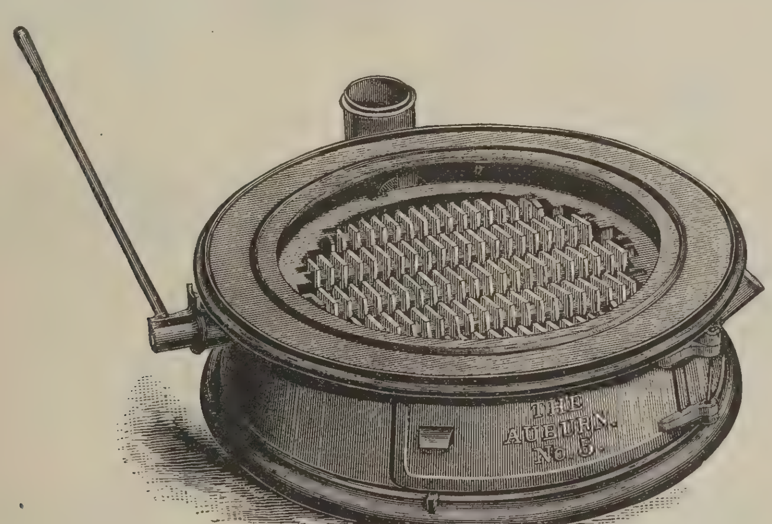


Fig. 14.—Woodcock's Shaking Grate used in the Auburn Boiler.

refer especially to the large and effective fire surfaces of these rings as making the boiler economical and efficient. In Fig. 14 a general view is shown of the Woodcock patent shaking grate, which is part of the Auburn boiler. It was the aim of the manufacturers to make a grate which should be as simple as possible, easy to manipulate and so formed as to supply the greatest amount of oxygen to the fire. The Woodcock grate is easily shaken or dumped by means of the single lever, shown at the left, which may be operated when the doors are closed, thus preventing any escape of dust. The fingers on adjacent bars keep a uniform distance apart in shaking, thus preventing coal from falling through and clinkers from becoming wedged between them, which otherwise would cause an unequal strain and consequent liability to breakage. To dump the grate it is only necessary to remove the stop mechanism, for without doing this the grate will not allow the coal to fall through. Fig. 14 shows the limit to which the grate may be shaken without removing the stop. No matter how hard or how carelessly the work is done, the lever cannot go any further, and it is, therefore, impossible to accidentally dump the grate.

The Howard Combination Heater.

We present in Fig. 15 of the illustrations a broken view of the Howard Combination Heater, manufactured by the Howard Furnace Company, Syracuse, N. Y. The combination heater consists of the ordinary form of the Howard hot-air furnace, provided with a coil in the fire-pot for heating water. By referring to the cut it will be noticed that the products of combustion are carried downward after leaving the combustion-chamber and travel around it without interruption from 28 to 40 feet inside of the casing before reaching the smoke pipe. This large extent of surface is obtained by a succession of two or three cast-iron radiators, which surround

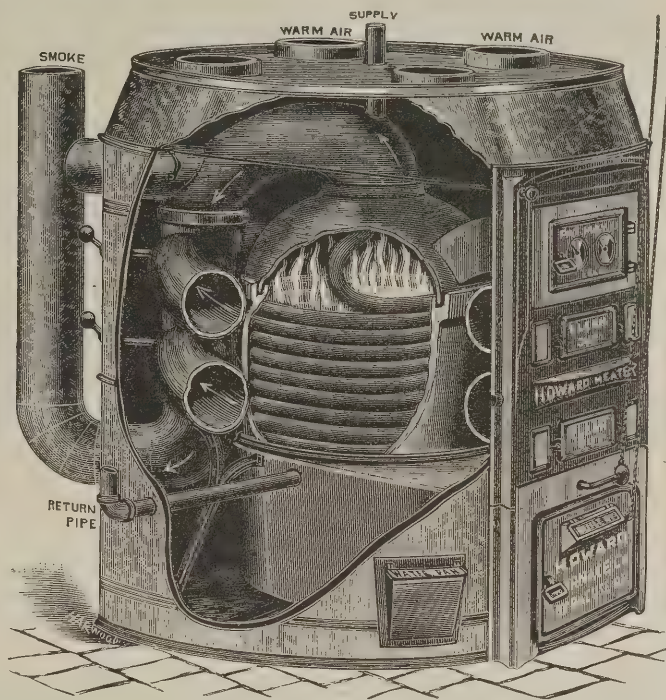
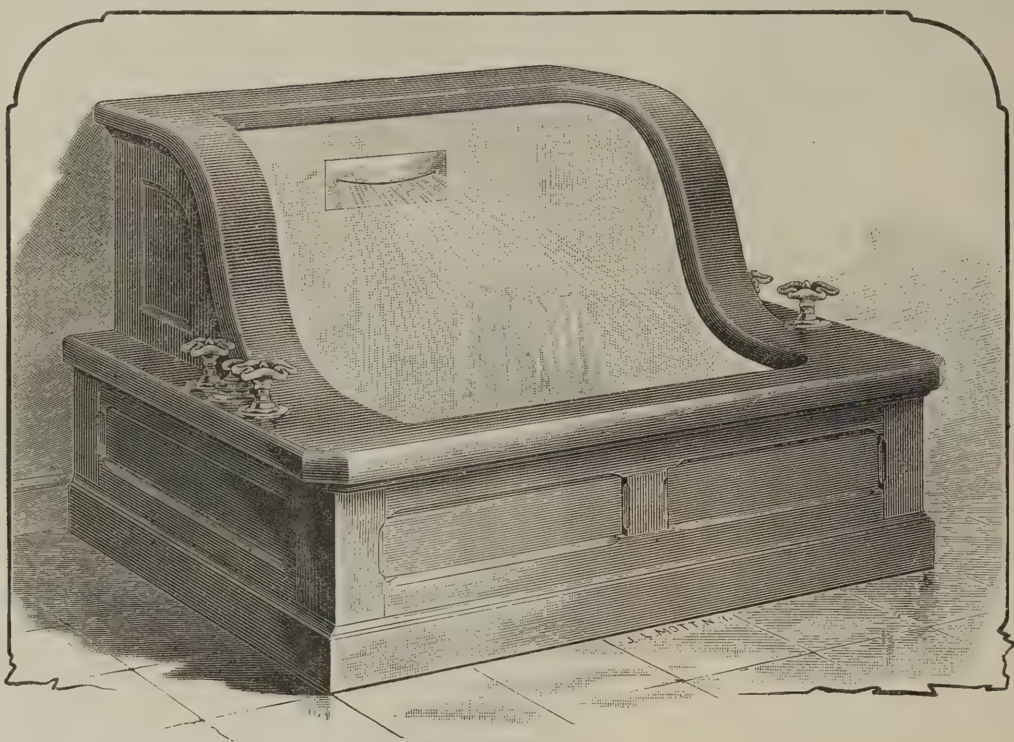


Fig. 15.—The Howard Combination Heater.

the fire-pot. The gases are deflected into these radiators by means of a damper placed at an angle of about 45° in each radiator, and it is stated that the lower radiator is nearly as hot as the upper one. In spite of the long distance traveled by the products of combustion, we are informed that the draft is perfect. There is, however, the direct draft going into the smoke pipe which is used when starting a fresh fire. Another feature to which special attention is directed is the low hight of the furnace, the smallest size when cased standing only 46 inches and largest 69 inches high. It is stated that the addition of the hot-water coil detracts but little from the air-heating capacity of the regular furnace. The coil shown within the fire-pot is made of heavy wrought-steel pipe and is tested to 200 pounds. The flame and hot gases come in direct contact with the coil and therefore rapidly heat the contained water. The radiating sur-face of the furnace is, however, not reduced by the addition of the coil, and, it is stated, the coal consumption is not increased. The capacity of the coil is from 400 to 1000 square feet of radiators, according to the size of the furnace. The Combination Heater is described as very simple in construction and easily tended. The furnace is at present made in five sizes, and the hot-water combination in two sizes. The position of the warm-air pipes as well as the connections for the supply and return of the water circulation system is indicated in the illustration.

Imperial Seat Bath.

A general view of the Imperial Bath, manufactured by the J. L. Mott Iron Works, 90 Beekman street, New York, is shown in Fig. 16, given herewith. The bath is made in various styles, with porcelain, porcelain-lined iron or copper seat and with combination wave and douche spray and patent Unique waste. The general shape of the appliance, as well as the streams of water thrown, are clearly indicated in the engraving, and but a few words of description will suffice. To bring the wave or back spray into operation, the two valves at the side-lettered "Cold Wave" and "Hot Wave" are turned. The bidet or douche is obtained by turning the two lettered "Cold Spray and "Hot Spray." The wave and spray can, however, be used either together or separately, as desired. Furthermore, by means of the Unique waste, water may be retained in the seat bath. The Unique is a special kind of stand-pipe, with perforations near the top for overflow. This style of seat bath is furnished in various combinations. The first is as shown; the second is the same as it is above, less the Unique waste; the third combination comprises the Imperial porcelain, porcelain-lined iron or copper seat bath, wave or back spray and supply fittings and Unique waste. The combination four comprises the Imperial porcelain, porcelain-lined iron or copper seat bath, with bidet or douche, spray and supply fittings and Unique waste, the same as in combination third.



Copyrighted 1888, by J. L. Mott Iron Works.

Novelties.—Fig. 16.—Imperial Seat Bath.

Humphrey's Circle Gauge.

The cut given, Fig. 17, represents an interesting tool made by the Humphrey Tool Company Warren, Mass. This gauge is intended for use in all kinds of wood or metal working where a scratch line is required on straight or curved edges. Its construction is shown in some detail in the illustration, which represents it full size except in length. As there indicated, it will be seen that the head is held in place by a lever, the operation of which is simple and efficient. The marking tooth, which is made of hardened steel passes through the bar, and emphasis is laid on the fact that the opposite points are always the same distance from the flat face of the gauge on the one side, and from the post on the other, thus making it easy to run a parallel line with the straight edge of the work, and by reversing the tool continue the line around all the curves. A fine adjustment is secured by means of the adjusting screw at the end of the bar. The simplicity and efficiency of this tool, the excellence of the workmanship and finish, and its comparative inexpensiveness, are points which are made in regard to it by the company.

Fig. 17.—Humphrey's Circle Gauge.

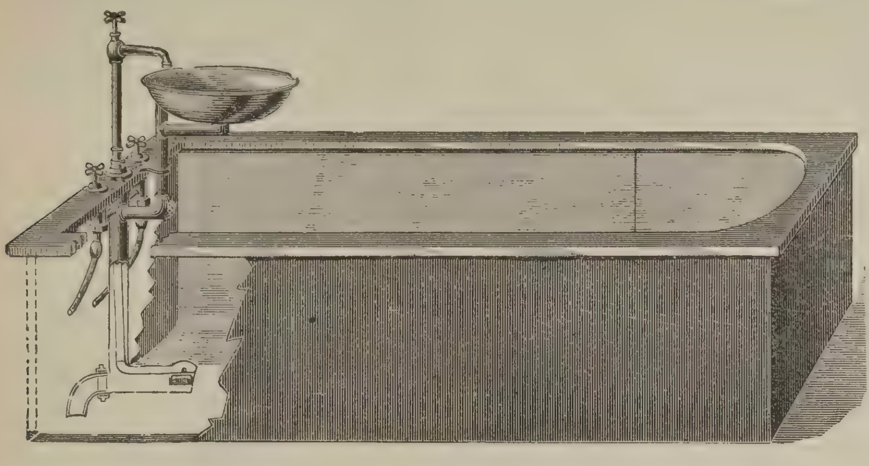
For the manufacture of this and other tools the company advise us that their factory is furnished with the most approved machinery, and first-class workmen are employed, so that they refer with confidence to the excellence of their manufactures.

Booth's Combined Bath and Wash-Basin.

We show in Fig. 18, on next page, a broken and general view of Booth's patent combined bath and wash-basin, manufactured by Booth & Son, 155 York street, Toronto, Canada. The wash-basin attachment is specially designed for those houses where, for want of space in the bathroom, a separate wash-basin cannot be used. The basin is pivoted, as shown in the engraving, and drains into the overflow of the bathtub. A special feature of this combination is Booth's patent bath-cock, shown at the left of the cut, by which hot and cold water are admitted either above or below. By screwing the middle handle down the water from the two side cocks is thrown up through the center pipe, while by raising the handle the flow is directed downward and enters the bathtub at the bottom, the special advantage of which is that the feed is silent, and, furthermore, does not raise so great a volume of vapor from the hot water as when the feed enters from the top. The upward feed is utilized either for shower or to supply the wash-basin. As shown in the cut, the feed-pipe passes through the waste-pipe and enters the tub just above the waste-plug, though the manufacturers inform us that they do not confine themselves to this method, as an independent pipe can be used and brought into the bath at any desired point.

Humphrey's Cavity Plane.

The Humphrey Tool Company, of Warren, Mass., are directing the attention of woodworkers to a very neat and convenient plane, which they are offering in three sizes of each style shown in the accompanying engravings. Fig. 21 presents a general view of the plane, showing the handles with and without tips. The center piece of the tool, holding the knife or cutting blade, is of metal, while the handles are of wood. The knife, which is of fine tool steel, is firmly held in position by screwing up one or both of the handles, or it may be done by removing the tips from the ends of the handles and inserting them in place of the handles, thus securing a very short tool. There are no set-screws or other projections, and the whole tool is constructed with a view to using in close places. As will be seen by reference to Fig. 21 of the engravings, the handles are slightly offset to enable the operator to employ the tool in surface-work. In Fig. 19 is shown the plane with the handle at the left removed, making it a right-hand tool. In order to adjust it for use in this shape it is only necessary to remove one handle and screw up the other. For a left-hand tool the reverse operation is necessary. In order to make such a tool as is indicated in Fig. 20 of the cuts, take off one of the handles, and, using it as a screw-driver, remove the tip from the opposite handle and insert it in the place occupied by the handle removed. Then take off by the same process the other tip and insert it at the opposite end. Set the blade well back and tap it down to the required cut, after the handles are well screwed up. The manufacturers claim for this tool that it permits of working on short curves and plain surfaces; that the various adjustments are easily and quickly made; that it cuts clear and in every way satisfactorily.



Novelties.—Fig. 18.—Booth's Combined Bath and Wash Basin.

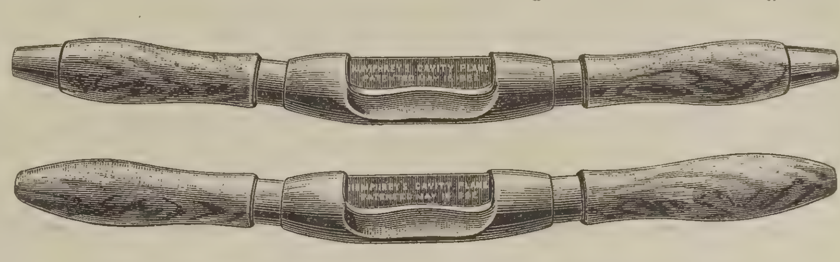


Fig. 21.—Humphrey's Cavity Plane.—Two Styles—with and without Tips to the Handles.

Fig. 19.—Tool Arranged for Use with One Hand.

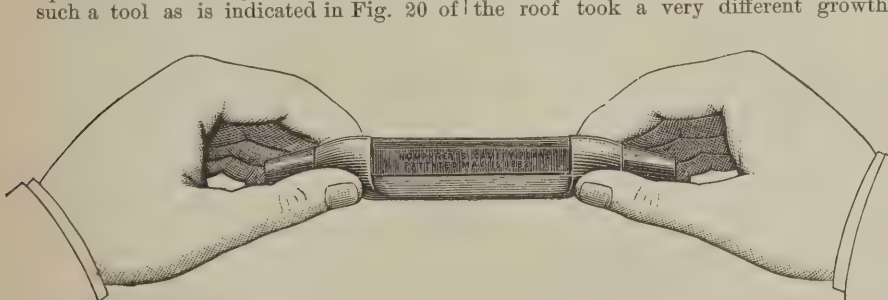


Fig. 20.—Short Tool for Use where the Handles would be in the Way.

The Roof in French Architecture.

An architectural writer of eminence, referring to the roof in French buildings, presents the following:

Ruskin has remarked that the first and most characteristic feature in a building is a roof, that the first ingredient of a habitable building is the roof, and it has long been observed how distinctive a feature it is, and how, as a general rule, its inclination may be taken as a proof, if I may so express it, of its original geographical position. Now, in this country and in France, in the latter times of mediæval architecture, the roof took a very different growth; with us it grew flat, in France and Germany it grew high and steep. Rickman observes, in his "Styles of Architecture," that in our late Gothic one of the distinguishing features is the embattled parapet. The roof had at that time so generally become flat that some relief and finish to the wall, and, indeed, some breastwork or protection to those using it, were required, and they copied the parapets of our castles, retaining by tradition, and probably for more richness of effect and diversity of outline, the battlement also, which became so indispensable a feature with our late mediæval architects that they introduce it as a decoration even on the transoms of the windows. Together with the four centered flat arches they used the flat roofs, and with the flat roofs embattled parapets; and the church towers were built without spires, and finished also with parapets. Now in French Flamboyant, that latest and, to my mind, very beautiful school of French art, the proportion became more elongated, the flaming of the tracery influenced the upward growth of the building, the lofty narrow window also caused it to grow in hight, and the roof grew with the rest of the building; and particularly on the tower, when spires had also fallen into disuse, the roof assumed almost the inclination, if not the place, of the spire, and the conical roofs to the circular angle turrets were, in fact, true spires, but being somewhat less elongated in form, retained the character of roofs. The roof with its overhanging eaves, and the cornice which supported it, rendered the parapet unnecessary as a matter of ornament; and as the roofs were inaccessible except by means of ladders attached to the projecting hooks, which we so commonly see on the steep roofs of French buildings, the parapets were also unnecessary as a matter of use; and thus in French late mediæval work the parapet is of very rare occurrence—indeed, I do not remember any example of it. I allude rather, however, to these features of French architecture because it seems to explain the tendency to high roofs, which to this day prevails in French architecture.

The work of regilding the copper dome of the State House, in Boston, has been commenced and will be completed in six weeks. It was originally gilded about 14 years ago. The dome is 35 feet high and 53 feet in diameter. The whole is enclosed in a cage of lumber, to serve as a framework for a canvas covering, for the protection of the gilders. The copper surface will be polished to the smoothness of glass, and then given a coating of size, over which will be a layer of yellow paint. The sizing will be composed of the best varnish, turpentine and the oldest pure linseed oil, and when this has partially set the surface is ready for the gilders. Two hundred and forty packs of 23-carat gold-leaf will be required. Each book is worth $4.70.

The Hastings Dormitory for Cambridge, now in process of erection, will be composed largely of iron beams and terra-cotta building blocks and the seven stairways all of iron, with a balustrade of wrought-iron strapwork. The exterior dimensions are 210 x 120 feet, and the walls are of brown mottled brick from Perth Amboy, N. J. The cost of the edifice is estimated at $230,000.

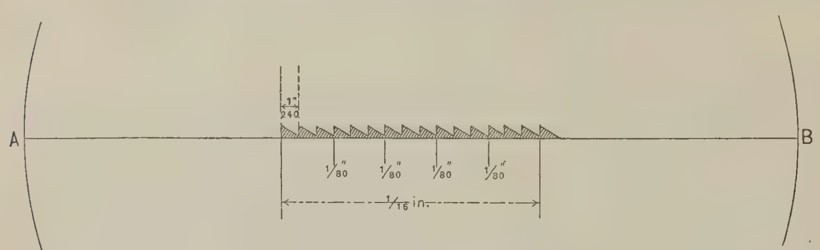
CORRESPONDENCE.

A Remarkable File.

From R. A. S., *Chicago, Ill.*—Most every ane is interested in any fine work, especially if it is done by hand. The file which

The File Full Size.

I send herewith came from Switzerland, and is hand cut. The teeth are so fine as to be invisible to the naked eye, and are double cut. There are 15 teeth cut to each $\frac{1}{16}$ inch, or 240 to the inch. The cut part of the file is $\frac{34}{16}$ long ($2\frac{1}{8}$ inch). As there are 15 teeth to each $\frac{1}{16}$ inch, $34 \times 15 = 510 \times 2$ (on account of double cut), there must be 1020 cuts on each side. The file is cut on three sides, so $1020 \times 3 = 3060$ cuts on the three sides. The file is tapering, and there are found to be eight teeth in the center, so by multiplying 3060 by 8 it is shown that there are 24,480 teeth on the three sides. The reader will, perhaps, admit that the title of the article is well chosen. A short explanation of how the above results have been arrived at may be interesting. The line A B in my sketch represents the field of view of the microscope, when reflected on the paper by the Camera Lucida, the eye-piece being 10 inches from the paper. A fine rule being put on the stage, it is shown that just



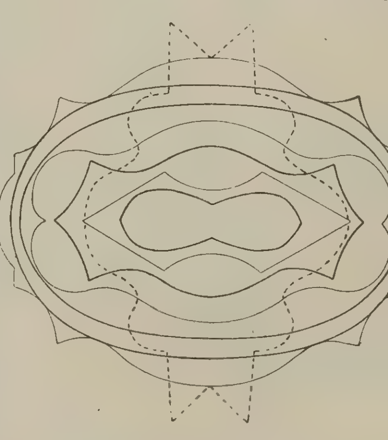
Field View of File in Microscope.

three sixteenths can be observed, as shown by the drawing. To save space, only part of the field of view is shown—it would be represented by a circle as large as A B. By placing a micrometer in the eye-piece, and looking at the rule, five of the markings on the micrometer scale are shown to the $\frac{1}{16}$ inch. That shows the markings on the micrometer to represent the $\frac{1}{80}$ inch apart. By placing the file on the stage of the microscope, it is seen that there are three teeth between each mark on the micrometer scale, as shown on the line A B, so the teeth are $\frac{1}{240}$ inch apart, or 240 to the inch. This way of measuring is not as accurate as can be done, for the writer has a scale, 1 inch being divided into 2500 parts, but for measuring the cuts on a file, which is a difficult object to manage with a microscope, the result is near enough for the purpose.

Note.—What our correspondent has described above cannot fail to interest the readers. We have had an engraving prepared of the file full size, and show the same herewith. We have also reproduced his sketch showing the result of looking at the article through a microscope. We find, however, that our correspondent is not correct in all of his deductions, and while the error is not enough to make the matter less interesting, it is well to call attention to the same simply on the basis of accuracy. Assuming that the measurements in the microscopic enlargement are taken at right angles across the teeth cuts (which they probably are), and measuring thus across the principal cuts, the file though $2\frac{1}{8}$ inch in actual length, is found to cross a space of a little less than 2 inches, which gives 480 of these cuts to the length of file. By placing the rule at right angles to the other or more oblique cuts a space of $1\frac{1}{4}$ inches is sufficient to include the length of the file which gives 300 of these cuts to a side, or a total of 780 cuts to a side or $3 \times 780 = 2340$, against 3060 given in article. As each of the first series of cuts is divided by the second, cutting into an average of eight teeth, then $8 \times 480 = 3840$, represents the number of teeth to each side, and $3 \times 3840 = 11{,}520$, the entire number of teeth, instead of 24,480 as our correspondent has it. Surely it is aremarkable piece of handwork.

Some Curious Shapes.

From B., *of Boston.*—It often occurs to those who have a nice box of drawing tools that some peculiar shape is required that the instruments refuse to draw. As an illustration of the above statement, a number of designs have been shown that the reader with the nice drawing tools is requested to duplicate, using the prescribed instruments for the purpose. To produce such shapes is very easy; all one has to do is to take a piece of paper, fold it one way, and then the other. The result being that there are four thicknesses of paper. Then take a pair of scissors, and cut most any way. When the paper has been opened out some shape will be shown. It is not so much of a trick to make something original as to avoid doing so. The shapes shown by the engraving were all cut out from one piece of paper, excepting the one indicated by the dotted lines. Two ovals are shown, and the reader who has a full-sized dictionary is



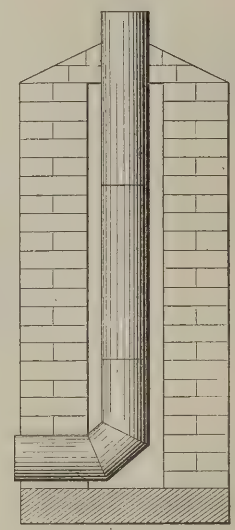
Some Curious Shapes.

at liberty to find names for the remaining designs.

Note.—Our correspondent is evidently away from his dictionary, or else it is a small one. We find no oval in the figure —but two ellipses are present.

Trouble With a Chimney.

From SUBSCRIBER, *Dundee, Ill.*—Wishing to learn some scientific principles in regard to chimney building for good draft, I call upon you. I have built a new house, and having had poor draft in a chimney in the old house, the flue of which was 4 x 12, and, wishing to improve the draft, I built my new chimney 8 x 12, and now find the draft is fully as poor as before, and am puzzled to account for it. I find that more fuel is used than before. My



Trouble with a Chimney.

opinion is that there is too much space in the chimney, and, if such is the case, I must reduce the size of the flue. I would like a little more knowledge on the subject before going to unnecessary expense.

Answer.—As is often the case with correspondents, some of the facts in the case are omitted. No mention is made of the number of pipes that enter this chimney, or their size, so we will presume that the chimney is for the sole use and benefit of the kitchen stove. Such being the case, there can be no doubt that the flue is too large, as the old one was too narrow. To remedy the difficulty, put a piece of stove-pipe in the chimney that will reach from the bottom to above the top. At the bottom it may be necessary to remove some of the brickwork so as to put on an elbow, in order to bring the pipe flush with the face of chimney. At the top cover the space between the pipe and brick with iron or brick so a tight joint will be the result. When a fire is built the air between the pipe and brick will become warm, so the conditions for a good draft will be as favorable as could be. A person who has had a varied experience with chimneys remarked concerning the above that many years ago the Emperor of China had a chimney built for his kitchen, and, as it did not draw as well as desired, he summoned all of his wise men to find out the difficulty. In this they failed, so the Emperor told them to go to work and find out as great a mystery as why a chimney would not draw when everything appeared to be all right. The wise men went to work, and, while many interesting (Chinese) puzzles have been the result, there has never been a man to take the prize, so a chimney with a poor draft became the father of all Chinese puzzles.

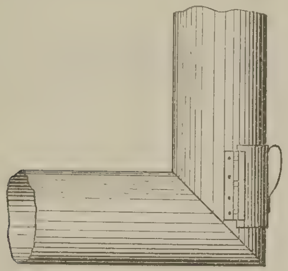
Dust in the Furnace.

We are in receipt of the following communication from an occasional correspondent on the subject of the accumulation of dust in hot-air furnaces, with suggestions for remedying the difficulty, which will be found of interest to our readers generally. He says:

The stuffiness of furnace air and the complaints in regard to burnt air which even yet prevail in many places should no longer exist. If furnace-makers and fur-

nace setters would give proper attention to their business they would have less cause to complain that the steam-heating apparatus is a troublesome rival.

It may be accepted as a fact that the hot-air furnace can give a free ventilation



Dust in the Furnace.—Fig. 1.—Showing Slide in 2-Piece Elbow.

and an abundant supply of warm, pure air for less money than any other system of heating. That it does not do so is notorious. The furnace for the first year is admirable. The second year it is almost as good. In the third and fourth years the air is not above suspicion and after that complaints have a strong foundation. Furnace dealers hear them, listen respectfully and do nothing. They set up new furnaces and follow the old plans with exactness, knowing that it is only a question of time when the same complaints will be renewed.

The secret of the bad behavior of the furnace is told in the single word—dust. There is dust in the pipes which carry the heat from the furnace to the rooms—dust on the heating surface of the furnace itself—dust and cobwebs in the registers. The dust is not drawn in from the outside air through the cold-air box. It does not consist of the external materials which

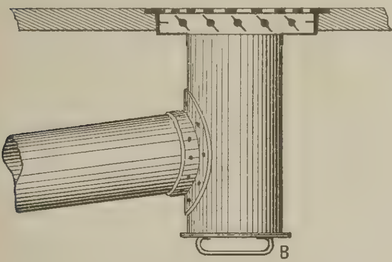


Fig. 2.—Cover in Vertical Section of Pipe.

constitute road and street dust, but is of an animal and vegetable nature almost exclusively.

How dust from the house can reach the furnace sometimes puzzles those to whom the subject has been mentioned. Lint and carpet sweepings form the bulk of it, as may be proved by opening any heater pipe in the fall. Some kinds of registers make greater collections than others. The best of them are bad enough. The bad odors and unpleasant effects of the furnace heat may be mostly traced to these collections, which have been stewed and steeped in the hot pipes winter after winter.

The heating surfaces get greater or less collections of dust, as may be demonstrated by making a quick fire in the furnace when the first cold weather comes in the fall. This dust is carried into the registers by the downward draft, which prevails in the pipes during portions of the months of June, July, August and September. During these months the air is usually much cooler than that out of doors, and therefore falls downward toward the lower part of the building. The dust is taken up by these downward currents and carried into the pipes, where it is deposited.

The remedy is a thorough cleaning and closing of the registers completely at any time when the furnace is not in use. Cleaning is the only effectual way, because the registers cannot be made so perfectly tight as to be dust-proof. The furnace casing ought to be provided with several doors, so arranged that through them access can be had to every portion of the heating surface of the furnace. The location of these doors will depend somewhat upon the internal arrangement of the furnace. Usually they can be placed on each side of the feed-door and opposite each other. Some furnaces should have one at the back, opposite the ash-pit door.

An important advantage follows the removal of dust, and that is an increase of heating power. A thin film of dust acts very much like scale on the heating surface of a steam boiler. In the latter, scale to the extent of $\frac{1}{16}$ inch represents the loss of about 19 per cent. of the heating power of the fuel. How readily a furnace can be cleaned can easily be seen by looking at the castings before they are put into place. Generally an opening a foot square, which will admit the arm and a long

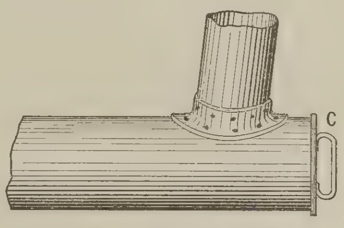


Fig. 3.—Cover in Horizontal Section for Purpose of Cleaning Pipe.

handled brush is all that is needed to thoroughly remove dust and dirt from one-half of the internal surfaces.

How to reach the horizontal pipes is a question which is not so readily answered. In the accompanying diagrams several suggestions which have been made are given. At A, in Fig. 1, it is proposed to put a slide in a two-piece elbow, and in this way be able to reach the horizontal part directly at B in Fig. 2, a cover is put into the vertical part and acts as a trap to catch the dust. Such an elbow, of course, would not be considered very good workmanship for a heater pipe, though it could be easily cleaned. In Fig. 3 the plan is to open the end of the pipe at C, and bring the vertical portion down with a sort of flange joint. The cleaning would be easily and well done, and the abrupt turn would be advantageous if the vertical pipe was large, because it would cut off the excessive draft. The plan is impracticable for work already in place. Fig. 4

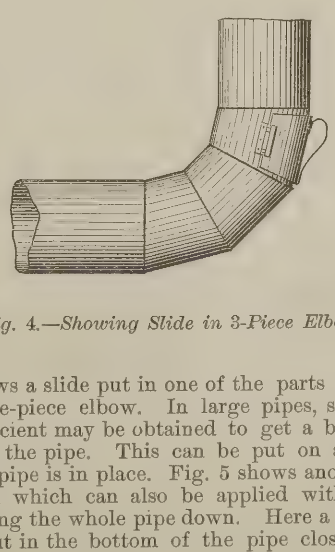


Fig. 4.—Showing Slide in 3-Piece Elbow.

shows a slide put in one of the parts of a three-piece elbow. In large pipes, space sufficient may be obtained to get a brush into the pipe. This can be put on after the pipe is in place. Fig. 5 shows another plan which can also be applied without taking the whole pipe down. Here a hole is cut in the bottom of the pipe close to the elbow at D. It is covered by a slide. To make a good job the slide should have its edge covered on three sides. In this manner it is possible to obtain a large opening, so that a long-handled brush may be passed into the pipe. In putting up new work it is usually possible, on all the larger pipes, to arrange a slip joint so that

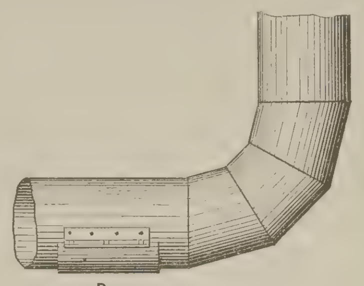


Fig. 5.—Another Plan of Accomplishing Same Besult.

the pipes may be separated at the elbow without taking the whole of the work down. In some jobs one pattern fo opening or one method of supporting the pipes will answer for all. In most cases a very little ingenuity will enable the fitter to put up a furnace in such a manner that its performance when ten years old will excite as little unfavorable comment in the sitting-room as it did when first erected.

Learning a Trade.

From Tin Chips.—There used to be a very general impression prevailing among people that a trade was a good thing to have on principle. It is to be hoped that this idea is not to be counted among the "lost arts." The following article from an exchange will be of some service to the younger readers. It is entitled "Herr Von Koben's Pastime Trade," and shows, by means of a story, the independence as well as usefulness of those who have trades in the world at large:

The young son of a wealthy land-owner of Silesia was fond of watching a jolly old nail-maker at his work.

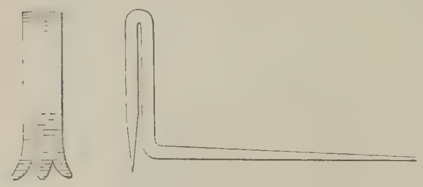
"Come," said the nail-maker, one day, half jesting—"come, Master Conrad, and show the world that the son of a rich man can learn a trade."

The lad fell in with the humor of the proposal, pulled off his fine jacket, donned a leather apron, and took his place at the anvil. He was bright and quick, and too high-spirited to back down after he had once undertaken to master the genial nail-maker's art. He worked faithfully, and in course of time learned to make a nail as well as old Carl. At the death of his father, Herr Von Koben, Conrad fell heir to a vast estate. But war came; a hostile army overran that part of Silesia, and Conrad's wealth was swept away. In poverty, he wandered into Bohemia, where, one day, he found among the mountains a host of shoemakers at a standstill for lack of nails. Shoes were in great demand for the soldiers, but without nails the shoemakers could do nothing. Here was Conrad's opportunity. He told the waiting men that if they would help him to a forge he would make the nails they needed. It was done, and better nails were furnished than they had ever used before. Conrad took apprentices, enlarged his shop, and in time Von Koben's nails were in demand on both sides of the mountains. By sure degrees Von Koben rose to be an extensive and wealthy manufacturer, respected and honored as the founder of his own fortunes and the introducer of a great industry. Thus the trade learned as pastime proved a blessing to the learner and to many more; and to the end of his days Herr Von Koben was proud to tell his children and grand-

children how he had been saved from poverty by the skill he had gained as a boy, never suspecting that he would ever have actual need of it.

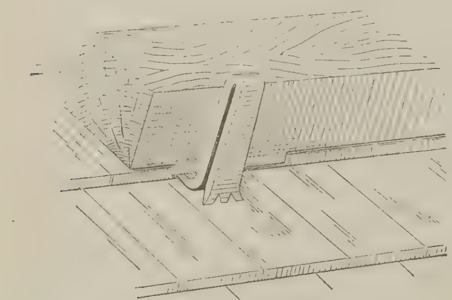
Shingle Staging.

From H. T. T., *Mount Morris, Wis.*—My attention has been called to the request of "O. B. M.," of New York, pub-



H. T. T.'s Shingling Bracket.

lished in the June number of *Carpentry and Building*, for a shingle staging. I have been using a bracket which I find perfectly safe and sufficient enough for the purpose. I had the blacksmith make me 20 or 30 brackets, and these I find sufficient for any of the buildings which are put up in this vicinity. The brackets cost me $1.50 each. They are made of ¼ to 1¼ iron, hammered flat at one end, which is to be run up under the next to the last row of shingles. About 4 inches from this point the iron is bent up from the roof about 2 inches, to hold the scaffold board. It is then bent back to the roof, so that the last end extends ¼ inch below the part that runs up under the shingles. This point is hammered flat and notched, as shown in the drawing, so that it will press



Staging Constructed with H. T. T.'s Shingling Bracket.

into the shingles and resist slipping. I have used these brackets for some time and find them to be reliable and quickly put in place.

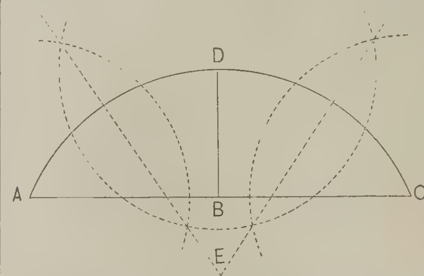
Size of Roofing Tin.

From YOUNG MECHANIC, *Brooklyn, N. Y.*—The roofs in my neighborhood are nearly all laid with 14 x 20 tin, but I think 10 x 14 tin is the best for a flat roof, because the nails are so near together that the tin only buckles a little when it expands. When the tin is laid in cold weather the probabilities are that it will not contract much more, so there is not so much of a chance for the seams to break apart from further contraction, providing the seams are properly soldered. When large tin is used for a roof, the nails are so far apart that the wind is apt to get under and draw the nails, working the tin up and down, which, in time, cracks the seams; 14 x 20 tin has twice as much strain on the seams as 10 x 14. When a roof that has been laid with large tin is walked on, and the seams are buckled, as they are apt to be, the seams are much more apt to be broken than if the small tin had been used.

Note.—When it is found out who struck Billy Patterson, then the roofers may decide which size of tin is the best for roofing purposes. Our correspondent is in favor of 10 x 14 tin, for reasons above given, and yet there appears to be no reason why 20 x 28 tin could not have enough nails put about the edges to hold it down to the roof in any ordinary wind. As the larger the sheets are the less seams there are to solder, or leak, as the case may be, it would appear to us, at least, that the chances are rather in favor of the larger tin.

Radius of an Arc.

From O. A. H., *Chariton, Iowa.*—In the November number of *Carpentry and Building* your correspondent, "A. S. R.," gives his method of finding the radius of an arc. In the note appended, the Editor leaves the question for general discussion, but thinks that some mechanical construction would answer the purpose better. I herewith submit a sketch showing my ideas of the problem. Let A C be the chord and



Radius of an Arc.—Sketch Accompanying Letter from O. A. H.

B D the rise. Set the dividers to any radius less than one-half the length of the chord. With A and D for centers, strike short arcs as shown, producing them until they intersect. Then through the point of intersection draw lines, producing them until they intersect, as shown at E. Then E will be the center from which may be struck the arc, and E D will be the radius for the same.

Poor Brickwork in Furnace Chimneys.

From T. C. *Chicago.* —When a building that is heated by a furnace catches fire, the probabilities are that the furnace will receive the blame without any one taking the trouble to find out the real cause. An incident illustrating the above occurred in Chicago some time since. There was an urgent call for a man to go and repair a furnace that had "set" a house on fire, and the writer was the one selected to go. His curiosity was greatly excited to discover how a furnace that had been warming a house for a number of years should so unexpectedly become incendiary. On arriving at the house in question it was found to be of wood, the chimneys being built in the walls in the usual manner. The fire had caught where the chimney passed through the first floor, and, to extinguish the fire that had burned away the surrounding woodwork, the clapboards had been torn off for about 12 feet up the chimney. There were about 20 holes in the chimney where smoke had come through and blackened the brickwork. Where the fire originated (at the base of the chimney) there were holes between the brick, as though there had never been any mortar used; or, if there had, that it had disappeared. Yet the furnace was supposed to have been the cause of the fire. The lady of the house was very indignant and wanted to know if "our firm" could not put up furnaces so they would not cause houses to burn down. Thereupon the holes in the chimney were shown her and it became plain that the fire had passed from the inside of the chimney to the woodwork; then, if the brick-layer who put up that chimney had been present, he would have received an oration that would cause him to wish his birth had been postponed a thousand years.

Durability of Tin Roofs.

From F. W. S., *Hinsdale, Mass.*—I would like to learn how long a tin roof, composed of good plates, will stand the weather without paint and not manifest any signs of rust. I covered a veranda roof for one of my best customers last December, using what I bought and believed to be a good roofing plate. The tin worked nicely, appeared to be well coated and was in all respects satisfactory so far as appearances went. The weather was such that it could not be painted. Now my attention is called to the fact, by the gentleman for whom the work was done, that rust has made its appearance on the roof in question. In the most exposed places the rust is quite thick, while under the eaves it shows comparatively little. What I want to know is, if it is anything unusual for a roof to show signs of rust in this way, after standing five months without paint. Will not any good plate do this under such circumstances?

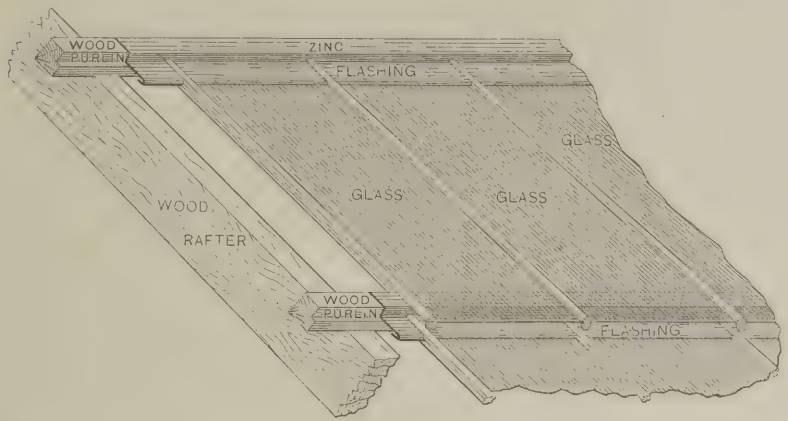
Note.—Our correspondent's question is of such a character that a satisfactory reply can be given only by a number of our readers, whose combined experience will go far toward indicating the general average in matters of this kind. There are very few plates in the market, we imagine, that will not rust under circumstances similar to those described, but this depends in some measure upon the location. A roof in clear air, not contaminated by smoke or vapors of any kind and away from the seashore, will not rust nearly so quickly as one situated under less favorable circumstances. We do not think that there is any very definite answer possible to our correspondent, but we shall be glad to have our readers give their experience in matters of this kind for the benefit of all concerned.

Placing Furnace Registers.

From P. B., *Auburn, Ill.*—As *Carpentry and Building* has devoted some space to the discussion of furnace questions in the past, I would like to further encroach upon the space allotted to the subject. First: Which is the better plan to pursue when a large room is to be heated, place the register directly over the furnace or remove it 5 or 7 feet away? Second: Why does the hot air sometimes come out of the cold-air box? Third: Suppose a register in the second story is to be located 10 feet away from the furnace, where would you recommend the stack to be placed, near the furnace, so as to have a short connecting pipe to the stack, and a long one leading from the stack to the register, or the opposite?

Answer.—The general method pursued by most furnacemen is to give the furnace as central a location as circumstances will permit, so that each pipe will receive its proper share of heat. In the furnace business, as in some others, it is not considered fair to rob Peter to pay Paul, and to locate a furnace so as to give one pipe or room all the heat, and would be hardly fair, to say the least. On general principles it is safe to assert that the more direct the pipes lead from the furnace to the registers the better. Regarding the second question, it is a hard one to answer without a plan of the building and surroundings, but as editors are supposed to be able to answer any question with only about the quarter of a question to work on, we will do the best that can be done under the circumstances. Let it be supposed that the cold-air box is on the east side of the house, and that the prevailing winds are from the west. When a hard wind is blowing the tendency will be for

the wind to form a partial vacuum on the east side of the house, and, if there are any doors or windows on the west side, the cold air is driven with great force through any cracks there may be. This gives the wind a chance to draw the air out of the cold-air box, or at least prevents the furnace from operating as it should. Those of the readers of this journal who have ever been in a blizzard may understand about how much cold air can come through a small opening. Thirdly, would depend upon a number of circumstances over which the furnaceman is not supposed to have any control. A basement should be of sufficient hight, so as to give at least 2 feet space between the furnace and ceiling. This opinion at least is indulged in by the fire underwriters. If this space can be obtained, then the pipe could have a good slant from the furnace to the stack. As most buildings are built there is little opportunity to give a pipe much of a slant. When as much attention is paid to the proper hight of basements as is paid to the external appearance of a building then it may not be such a rare thing to see a smile on the face of a furnaceman.



Glazing Without Putty.—Fig. 1.—Portion of Roof.

A Calked House.

From B. L. V.—As *Carpentry and Building* devotes some space to steam heating, there may be some who would like to know how I made a steam heater work. The house the heater was put into was a large one, and the work had been done as well as could be. When the cold weather came on the heater did about everything but heat the house. About every one in the shop had a chance to make the heater work, but without avail. All of the "big heads" did what they could, but the house was too cold for comfort. As a last resort, the boss came to me and told me that if I did not find out what the matter, the heater would have to come out. I hated to have the boss loose the job, but was afraid that it would be rather hard to succeed where others had failed. Just for the looks of the thing some tools were taken, and a helper went along to carry the tools. After looking the house over nothing was discovered, but the helper had been following me about, and when I was about ready to leave he asked me how steam-pipes could heat a house when the (cold) wind was blowing in every crack about the numerous windows. It appeared as if the helper had discovered the difficulty. The next thing done was to procure the services of a calker—if that is what they are called. A good man was secured, and he was requested to make every joint about the house at tight as the deck of a steamboat. After this operation had been performed it was curious to see how the heater appreciated it. There was no more trouble with the heater, and the house was as warm as could be desired. A subsequent conversation with the calker disclosed the fact that he knew something about the heating business, and his ideas on the subject were that when the wind blew into a room through the cracks the cold air would condense the steam in the pipes just enough to prevent them from doing their work properly, and that the fireman might put on all the fuel he pleased, but until this supply of cold air was shut off the heater would not operate satisfactorily. It may be that some of the readers have had some adventures with steam heaters, and if they would relate their various experiences much good might be done.

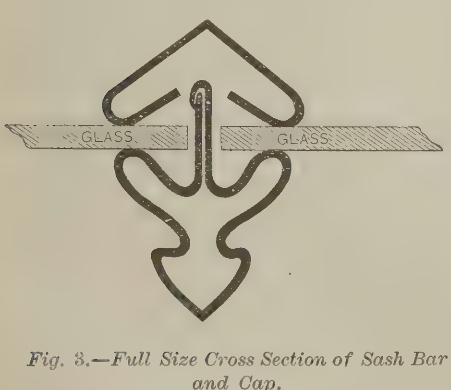


Fig. 3.—Full Size Cross Section of Sash Bar and Cap.

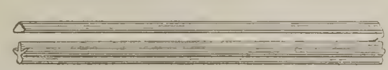


Fig. 2.—Sash Rar and Cap.

The Misuse of Tools.

A correspondent in Chicago who has read the little item bearing the title above printed on page 163 of this volume suggests the following addition to it:

> Then when he wanted a small punch
> He went and got a nail;
> It doubled up; he smashed his thumb,
> And then "set up" a wail.
>
> He then did use some naughty words
> That were quite bad to hear,
> And straightway "blew his money in"
> For drinks of worse than beer.
>
> For those who would a moral learn
> From this truthful story,
> You never should the wrong tools use
> If you wish to go to "glory."

The idea is certainly all right, but if our correspondent should try to set these lines to music—for instance, to the good old tune to which the mind at once turns when reading the original, of which our first publication was a parody, "There was a man in our town"—we fear he would have difficulty with the meter—in places at least.

Pockets for Window Frames.

From O. B. M., *New York City.*—Will you kindly inform me through the columns of *Carpentry and Building* if there is any fixed rule regulating the length of pockets in window frames while working, or any schedule for the different weights ?

Note.—We do not know of any rule except that of general adaptability and providing that which is needed for the purpose. The weights must be calculated with reference to the sash that are to be balanced and the pockets must be arranged to accommodate the weights. Unless it is known what kind of sash is to go in the frames and what kind of glass the sash are to be supplied with, it would be difficult to make the calculation.

Glazing Without Putty.

In one of our English exchanges we find a description of a system of glazing without putty, recently brought out by Treggon & Co., of London. The description given, however, is so very brief that an idea of the system will have to be gained chiefly from the cuts. Fig. 1 shows a portion of a roof glazed according to Treggon & Co.'s system, while the sash-bar and cap are shown in Fig. 2. A full-size cross section of the bar and cap are shown in Fig. 3. For a further description of the system we quote from our contemporary as follows: "By means of this invention all screw holes or nail holes through the outer surface of the bars are entirely abolished. Nevertheless, breakage is quite impossible, owing to the way the glass is fitted in. Another advantage is that the dark marks from condensed water that disfigure the bottoms of ordinary sash-bars do not occur, owing to the fact that condensation is provided for by a channel on either side of the bar. The cap is self-fixing, and is worked by a wire spring and underlock arrangement. By this means the glass is prevented from slipping down."

We learn from the National Sheet Metal Roofing Company, of New York, that trade this summer is very good with them. They report that they are especially successful in securing contracts for church work. Quite recently they have received orders for the roofing of a church building erected at Manassas, Va., and another at Tuskegee, Ala. Two hundred and twenty-five squares are required in these two buildings alone. They have also received orders from Mechanicsville, Md., for the roofing of a small Catholic church to be erected there, and they lately made a large shipment to the Institute for the Education of the Deaf and Dumb, at Jacksonville, Ill. The latter was the third order from the same source. The company inform us that in this case the superintendent added a postscript to his letter in the following terms: "We consider your shingles the very best roofing material that we have ever seen."

There is a marked decrease in the number of buildings for which plans have been filed this year in New York City. The records at the Bureau of Inspection of Buildings show that the cost of the buildings in these plans for the quarter ending with March was $9,460,491, and for the quarter ending with June was $15,897,204, making a total for the six months of $25,357,695. This is a remarkable decrease from former years. The total for the first quarter in 1886 was $17,088,643, and for the same period in 1887 it was $17,254,865.

TRADE NOTES.

WE HAVE RECEIVED from W. B. Ostrander & Co., 21 and 23 Ann street, New York, a copy of the sixth edition of their catalogue of speaking-tubes, mouthpieces, alarm bells, gongs, bell-hangers' hardware, &c. It is a substantial pamphlet of nearly 90 pages, carefully printed, thoroughly illustrated and of general use to all who have anything to do with supplying material of this sort.

AT THE CINCINNATI EXPOSITION Mr. Lawrence Mendenhall, manufacturers' agent, makes a display of the patent inside sliding blinds made by Mr. William Willer, of Milwaukee, Wis. The practical application of these goods is demonstrated by means of a handsome structure 12 feet high, occupying a plot 10 x 15 feet in size.

IN RECOGNITION of his services as a technical writer on subjects relating to architecture and architectural engineering, Mr. C. Powell Karr, C. E., Ph. B., has been tendered a fellowship in the Society of Sciences, Letters and Arts, of London, England. Many of our readers will recognize in Mr. Karr one of our most valued contributors.

IN ANOTHER PART of this issue the Stanley Rule and Level Company, 29 Chambers street, New York, direct attention to Tolman's Roofing Bracket, which was illustrated among our Novelties in November last. Roofing brackets, as many of our readers know, have in the past come and gone. The demand for them goes on forever, and yet the supply is uncertain. The fact that this company have undertaken the manufacture and sale of this article, which many of our readers seem to think is among the best that have ever been put out, is a guarantee that there will be a definite source of supply for the future. Its advantages include the facility with which the bracket can be set and released in practical use, and the superior grip of the article, which is not dependent upon nuts, bolts or cams, but, on the contrary, is the result of the form of the bracket and of the material of which it is constructed.

WE HAVE RECEIVED from C. Powell Karr a copy of the "American College Manual," a work which he has recently compiled and edited. It is a handbook of information concerning course of study pursued, the requirements of admission and the approximate cost of collegiate or technical course of instruction at the principal universities, colleges, technical schools and other institutions of learning for the higher education of young men and women. The pamphlet has been very handsomely published by William T. Comstock, 23 Warren street, New York.

TOWER & LYON, 95 Chambers street, New York, have ready No. 6 of their illustrated catalogues and price lists, describing specialties in hardware and mechanics' tools of high quality. It is a book of 130 pages, bound in limp cloth covers and profusely illustrated. Chaplin's patent bench planes, in various sizes and styles, are first shown, following which come Champion Screw Drivers, Excelsior Expansion Bits, Hand Drills, Adjustable Clamps, Extension Plumb and Levels, &c. We have not space to enumerate the contents of the entire book, but it is sufficient to say that it is interesting from beginning to end.

KELLEY, JOHNSON & BLISS, of Chicago, announce a very fine catalogue of tools which they are anxious to distribute to the carpenters and builders of the Northwest. An edition of some 10,000 copies has been published, so that those of our readers who send in their applications early will no doubt secure the object of their desires. The book is intended to be a general assistant to woodworkers in the selection of such tools and devices as are desirable for their use.

IRVING BROTHERS, Elwood, N. J., are directing attention to a line of building papers which are of interest to all who are users of this kind of material. They refer particularly to their Manila Building Paper, and also to their Manila Oil Cloth. Samples which we have inspected of this line of papers show them to be excellent of their kind.

MR. C. POWELL KARR, architect, with office in the Stewart Building, New York, among other work, is at present engaged upon plans for a store and storage warehouse in East Seventy-fifth street, this city, to cost some $12,000.

WE ARE INDEBTED to the Gutta Percha Paint Company, of Providence, R. I., for a copy of a very handsome and thoroughly illustrated pamphlet of some 200 pages, not including advertisements, entitled "Picturesque Narragansett." It is a guide to Providence, Newport and other places in the vicinity of Narragansett Bay, and is gotten up in imitation of the magazines and reviews. It is handsomely printed, carefully illustrated and thoroughly indexed.

SAMUEL CABOT informs our readers this month that the buildings of the Augusta Exposition, Augusta, Ga., are being painted with Cabot's Creosote Stains. Samples and circulars are offered upon application.

THE RUSSELL & ERWIN MFG. COMPANY, of New Britain, Conn., with warehouses in New York, Philadelphia and Baltimore, direct the attention of our readers this month to the Perfect Door Check and Spring, which has found favor in many directions. It is in use on a large number of dwellings, public buildings, railway stations and railway cars. It has the advantage of being simple in construction and of being easily applied.

IN ADDITION to the agents heretofore named for their specialties, F. W. Bird & Son, of East Walpole, Mass., manufacturers of Neponset Waterproof Paper, mention in this issue of the paper M. Ehret, Jr., & Co., of Chicago, and the Canton Iron Roofing Company, of Canton, Ohio., as supply depots. They invite the trade generally to send for prices.

TOWER & LYON, 95 Chambers street, New York, present in their card in the present issue illustrations and a description of Wood's Patent Extension Plumb and Level. The attachment which has been applied to this tool renders it of the greatest service in laying out foundations for buildings, and in doing amateur surveying work as well.

BULLARD & GORMLEY, 106 Lake street, Chicago, direct attention to the Endless Anti-Friction Door Hanger and the Standard Door Hanger which they are manufacturing, and which is sold very generally through the trade.

G. BICKELHOUPT, 243 West Forty-seventh street, New York, invites the trade to send for his illustrated catalogue of Patent Metallic Skylights.

MANY OF OUR READERS are practically familiar with the merits of the Florida steam heater, manufactured by the Pierce, Butler & Pierce Mfg. Company, of Syracuse, N. Y. They announce a new illustrated hand book, which they are sending out to all applicants.

THE UNITED STATES GUTTA-PERCHA COMPANY, Providence, R. I., announce that copies of a little book entitled "Valuable Decorative and Preservative Paint, How Produced and Where Obtained," will be sent free on application.

THE CINCINNATI CORRUGATING COMPANY, Cincinnati, Ohio, inform our readers that they can make it to their advantage to correspond with them before orders for plain and corrugated iron and steel roofing, siding, ceiling, arches and lath are placed elsewhere.

THE HUBER MFG. COMPANY, with office 625 Walnut street, Philadelphia, are directing attention to the Huber Spiral Brace and Screw-Driver, which is illustrated in their card in another part of this issue. The tool is all steel and brass. The design is simple and the article has the advantage of being free from ratchets and wooden handles, which sometimes break in use.

GOODELL & WATERS have moved their Chicago warehouse from Nos. 31 and 33 South Canal street to Nos. 63 and 65 of the same street. They carry a full line of samples at their Western branch as well as at their home address, 3301 Chestnut street, Philadelphia.

CHARLES A. STRELINGER & CO., of Detroit, in this issue present a number of facts relating to their catalogue and their general scheme of business which are of interest to our readers. A catalogue of 200 pages, which contains upward of 700 illustrations, is sent to all applicants upon receipt of postage.

THE NATIONAL SHEET METAL ROOFING COMPANY, of New York, present in another part of this issue several reasons why their leading specialties are of particular interest to the trade. They offer an illustrated catalogue free.

THE GILBERT LOCK COMPANY, of Newark, N. J., have recently removed their works from 136-138 Front street to the corner of Hamilton and Railroad avenues, thereby securing greatly enlarged and improved facilities.

Bricklaying in Frosty Weather.

The following extract from a consular report with reference to bricklaying in frosty weather in Norway was published some time since in one of our English exchanges. It relates to a subject that is of perennial interest to the readers of this journal. It is of value in the sense of showing what the practice of builders in very cold climates is in matters of this kind:

Building operations are suspended in Great Britain on the slightest approach of frost, while bricklaying is carried on in Christiania in almost the coldest weather that prevails for any time. Building during the winter months has been practiced for at least 12 years, but more frequently during the last five. All the buildings erected during the preceding periods have stood remarkably well, there being only one case in which bricklayers' work had to be partly done over again, owing to an uncareful preparation of the mortar. Experience has not shown that walls built in winter exhibit later more dampness than those erected in summer. The reverse may be the case, since the difference between the temperature of the air and of the mortar cools the latter by evaporation and takes away a great part of its moisture. The principal builders in Christiania are of opinion that bricklayers' work, executed with due care, in winter is superior to similar work done in summer. The whole art of executing bricklayers' work in frosty weather consists in the use of unslaked lime, the mortar prepared with which being made in small quantities immediately before use, and the proportion of such lime is increased—together with the expense of building—as the thermometer falls. The only care required is to utilize the unslaked lime so handily and quickly as to enable the mortar to bind with the bricks before it cools. Another very important condition is that the bricks should always be kept covered on the building site. Bricks which have been out in the rain or exposed to the frost should never be used. The upper courses of bricks that have been laid are not, as a rule, covered with mats or planks for the night, that precaution being only adopted when the work has to be suspended for a certain time, and when it is therefore necessary to prevent rain from penetrating the brickwork and destroying it by the action of frost. When no such covering is used it is absolutely necessary, after a fall of rain or snow—and after the suspension of work on Saturdays—to see that all ice or snow is removed from the walls before the work with warm lime is resumed, to prevent the warmth of the lime from being absorbed. The removal is effected by brooms and spades, but the fire of a brazier is often used. Outside plastering in frosty weather is not possible, as the manual ornamentation of cornices, &c., requires much longer time than does the mortar to lose its warmth.

The question as to whether there is any or what limit to bricklayers' work in frosty weather is an open one. Among the members of the Norwegian Society of Architects and Engineers, which has frequently discussed the subject, that limit is variously estimated at between 14° to 18½° F. and 1¾° below to 5° above zero F. The advocates of the latter maximum having proved by haudraulic tests that good bricklayers' work can be executed in 33¾° F. of frost, the society has arrived at the conviction that the variations in the opinions on the subject are due to the degree of care bestoyed upon the preparation of the mortar. The adoption of a maximum limit of frost should therefore depend solely on the possibility of enforcing a fixed rule for the preparation of the mortar by the workmen. As the difficulties in this respect increase with the degree of cold, it has hitherto been accepted in practice that bricklayers' work does not pay in Christiania in more than 9½° to 14° below freezing point F. In the case of public buildings at Berlin such work is not allowed when the thermometer registers less than 2½° F.; but this is probably owing to the scarcity of unslaked lime in the German market, whereas in Norway lime is always supplied to the market in a burned, not slaked, condition. The wages of bricklayers in Norway are for a day of ten hours, first-class hands from 4/6 to 5/, second-class hands from 3/4 to 3/11, hodmen from 2/3 to 2/9 and in winter proportionally, according to the number of hours worked.

THE CINCINNATI CORRUGATING COMPANY, Cincinnati, Ohio, mail us a copy of their catalogue of roofing and roof trimmings, of the issue of March last. This book was reviewed at some length in our columns some time since.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

AT THE FIRST convention of the National Association of Builders, held at Chicago in the spring of 1887, the question of uniform contracts came up for consideration and resulted in a resolution to the effect that the National Association of Builders, the American Institute of Architects and the Western Association of Architects should co-operate in drawing up a uniform blank for contracts, under which the interests of owner and builder should be properly protected. A special committee was appointed to confer with the American Institute and the Western Association, and as a result committees were appointed by the three associations to confer together and draw up the proposed uniform contract blank. The joint committees after much conference and correspondence adopted a standard form of contract which they now submit to the three associations. In order to preserve the form from errors and alterations it has been copyrighted, and arrangements have been made to supply copies to all who desire them at a reasonable figure. We print the contract in full in another column. An inspection of the form shows the extreme care with which it was devised. Without being too long, or in any way complicated the form of agreement defines clearly the relations between the owner, architect and builder, and what is particularly commendable is that it provides for the appointment of arbitrators, to whom shall be referred all disputes regarding the valuation of work added or omitted. Blank spaces are left for the insertion of all varying particulars, but, of course, the form may be altered by the mutual consent of the parties to the agreement. As the standard form is, however, in all cases the same, any changes made in it will be readily perceived. The originators of the idea that resulted in the adoption of this standard form of contract deserve the highest praise, for they have been the means of shutting off the innumerable disputes that are forever arising between the several parties interested in the construction of a building.

IT IS SCARCELY to be supposed that such a contract would pass the scrutiny of the different architectural and building journals without criticism. The *American Architect and Building News*, for example, says: "In one or two respects we think the form might be improved," and continues: "In its first clause the agreement provides that the contractor shall well and sufficiently perform and finish the work required under the direction and to the satisfaction of the architect, acting as agent of said owner." Our contemporary italicizes the last clause and says: "We suppose that the Joint Committee must have had good reasons for inserting the words which we italicize, but it seems to us that very good ones ought to be necessary for incorporating in a building contract an admission that the architect is the agent of the owner, as against the contractor, instead of being what the law presumes him to be—a learned and impartial judge between them." We imagine that many builders will appreciate this point, especially those who, in the past, have assumed that the architect was a learned and impartial judge, only to find, in case of dispute, that he necessarily sided with the owner, because he was the paid agent of the owner. For ourselves, we think the contract is in good shape in this particular, because it admits a fact which is patent to every one who has had building work to do, and because, in expressly defining the architect to be the agent of the owner, it puts that functionary where he really belongs. We imagine that this definition of the architect's position will have the further effect of causing some of the craft to be less willing to accept commissions on materials furnished and work done by contractors than at present.

THE *Inland Architect* and *News Record* says of the results of the joint committee's efforts: "This standard contract is distinguished from every form which has preceded it by its completeness, its directness, its impartiality toward both owner and contractor, and its freedom from the tautological repetitions so customary in legal documents. The language is simple and clear. This contract explicitly stipulates that all drawings, plans and specifications are the property of the architect. Changes are to be executed as ordered, and if a price cannot be agreed upon in advance, the work shall be done, nevertheless, and arbitration shall award just compensation later. Safe facilities must always be maintained for the architect's inspection of the work. The owner is made to agree that all material and labor which he is to furnish shall be so delivered as to cause no delay in the completion of the building. He is also to effect insurance during progress in the contractor's name as well as his own. Just provision is made for interruptions of the work by strikes and by 'the unusual action of the elements.' We trust every builder will examine the form carefully, and that if it meets his approval, he will insist upon its employment in every piece of work upon which he is engaged."

SHEET-IRON FRONTS for buildings in place of stone or cast iron are gradually growing in favor in and about New York, and when better known and their durability acknowledged they will, no doubt, on account of their cheapness and adaptability to various requirements become great favorites. Among recent work of this character a building in Brooklyn is worthy of special notice. It is located on Brooklyn avenue, near Atlantic, and is a four-story apartment house. The entire front above the first story, which is of brick, is made of No. 20 galvanized iron. Each section of the building has a bay-window running the entire hight, of which the bases and panels are elaborately ornamented. In addition to the bays the front is further relieved and diversified by panels and pilaster ornaments with scrolls and rosettes of a bold and effective design. That uneven, wavy appearance too frequently seen in sheet-iron work is entirely overcome in this job by the iron being crimped before making up.

ON VARIOUS OCCASIONS we have referred to the excessive price of sheet copper and the influence it was likely to have on the use of this material for architectural purposes. We have pointed out that, as copper diminished in price, there would be an increased consumptive demand for it for roofs, cornices and other similar work. Quite recently one or two of our exchanges have been discussing this question. The Boston *Commercial Bulletin* of recent date says that different opinions prevail among the members of the copper working trades as regards the effect of the French syndicate upon the business in general. Some think that the recent advance in price has caused persons using that material to supersede it by some other metal that is cheaper than copper. Others, just as competent to judge, believe that the rise has not hurt the business. One member of the trade when interviewed on this point said: "When I first went into the business in 1841 copper was then at the same price as it is now. It continued at 25 cents for a number of years, and it was not until the price of everything went up during the last war that this price was advanced to 72 cents a pound. After the war came the reaction and sheet copper dropped to 16 cents. A competition between two dealers some time since brought the price of sheet copper to 14 cents. It has remained around these figures until the syndicate took hold of matters and the price was advanced to the figure at which it stands at present." Our contemporary continues that bunching opinions there is little doubt that the legitimate copper trade has fallen off considerably by the raising of ruling prices. On the other hand, it maintains that in the use of copper in architectural work there has been no dropping off. If this is true, and we confess that some facts which have been brought to our notice would seem to con-

firm it, it is evident that the demand for copper for architectural purposes is so firmly established that a little difference in price does not reduce it, although the increase may not go on as it otherwise would. We think that if the price of sheet copper had remained lower than it now is the consumptive demand for it for roofing and cornice purposes would have rapidly increased. The fact that this demand has not positively diminished is strong evidence of the repute in which copper is held at the present time by architects and builders.

EVER SINCE sheet steel practically superseded sheet iron for various purposes in the arts, there have been controversies concerning the use of steel and iron. As things were some time since steel was the more expensive metal of the two. With modern processes of iron-making, the term "steel" has been retained, meaning a different article, however, from that which the public has understood by the term "steel." We remember some 12 or 13 years since having our attention called to galvanized sheet steel, and at first blush we expected to see something springy like a saw blade, and were in a measure surprised to find it almost as soft as lead. The fact that steel has long been regarded by the public as a very choice article, and notwithstanding it is at present made by manufacturers by modern processes very cheaply, in some cases cheaper than iron, has led to the use of "Steel *versus* Iron," as an advertising scheme. Certain circulars have recently appeared which are characteristic of the controversy. For example, some roofers claim great credit for using steel, while on the other hand, others use steel simply because it is the cheaper and better material for their purpose. So well established is the demand for sheet steel, to be used where sheet iron was formerly employed, that some manufacturers complain that some of the sheets of steel sold in the market at the present time have sheets of iron sandwiched between them.

THE IDEA of industrial education is continually gaining ground, and there is growing evidence in the belief that industrial or manual education of some sort will ultimately be introduced in all the public schools. New York City has already made favorable progress in that direction, and word now comes from Pennsylvania to the effect that that State will quite likely be the first in the Union to introduce industrial training in its public schools. Dr. Atherton, president of the Pennsylvania State College, is soon to call a meeting of the Industrial School Commission, of which he is chairman, for the purpose of deducing a report from the information the commission has gathered in regard to industrial schools in the United States and Europe, and to make some recommendation to the State Legislature as to the best methods for establishing the industrial system as a part of the common school system. According to a recently published interview with a member of the Commission it was remarked that the incorporation of industrial education into the public schools was experimental, and that the plan would be first thoroughly tested in a practical scale before permanently adopting. If proven successful in the cities the industrial feature might then be introduced into the country schools, for it was very truly said that manual dexterity is of as much value to rural as to city people. Whatever may be the results of the first experiments of adding industrial training to the public school system, there is no doubt but that the newer branch of education will be finally established everywhere. The demand for practical instruction does and will exist, and it only remains to meet it in the most practical way. Much has been done already, but what has been accomplished in the past is but a fraction of what will be done in the future.

THE FALL of a church tower in a neighboring city a few weeks since, on account of attendant circumstances, attracted wide attention. A commission was appointed to investigate the accident, and their conclusions, which have been published, will command perhaps as wide attention as the accident in the first place. Just as men's interests or pursuits may influence their judgment, so opinions are likely to differ as to where the responsibility for such a disaster should properly rest; but to the mind of the intelligent and disinterested person, says one of our correspondents, there can scarcely exist a doubt that the architect, who in this case was also the superintendent, is the one who must primarily and finally be held accountable both morally and legally. From this conclusion, continues the same authority, there appears to be no logical escape, and yet should the expense of rebuilding the tower or the loss incident to the accident be put upon the architect it will be in some respects a new departure.

A WRITER who has given this particular case most careful investigation sums up the matter in an exchange as follows: "The province of the architect is to furnish the designs and prepare the plans and specifications, and by him, or with his advice or approval, all contracts for carrying them out are made. When he demands and is paid a liberal fixed commission upon the entire cost of a building constructed under these conditions he assumes absolute control of the affair for his client, and thereby stipulates to see that only sound and suitable materials are used, and that the work is properly done in every respect. It may be, and doubtless it often happens, that contractors and those acting under them introduce or attempt to introduce inferior materials, or slight or seek to slight the work they have agreed to do; but that is a matter directly between them and the architect, not between them and the architect, nor between him and the owner, except as the interests of the latter are affected. That is precisely what the architect has undertaken and is paid to prevent. If, through ignorance or carelessness, he does not prevent it, and loss or damage occurs in consequence, he should not attempt to shirk the consequences or fail to make his client whole in every respect. It is not alone the architect's professional reputation that is taken into the account when he is employed. His technical knowledge, his experience, his judgment, his vigilance—in short, his full ability and willingness to protect and promote the interests of his client become elemental factors. Upon this point all the relations between the architect and his client must rest. If these requisites be not assured when his services are secured of what use is he? If the owner must personally see to it that all conditions of the contract are faithfully performed and that neither bad material nor poor workmanship enter into the construction of his building, he would naturally part company with the architect when the plans of the latter are prepared, and for which the compensation is fixed on a basis altogether different from that involving a handsome percentage on all the materials and labor employed. To us it seems that no other view can justly be held, and if an architect acting under such conditions should fail to step forward and assume the full responsibilities of his position, and thus hold his employer free from loss or expense in making good all resulting defects or damages, he should, and doubtless would, be made to do so by the courts of justice."

THE PLATES.

In Plate XXXVII are presented the perspective view, elevations and floor plans of a five-room cottage, designed by G. W. Payne, of Carthage, Ill., the details of which are presented on pages 210 to 212, inclusive.

It is not often that we have the opportunity of presenting to our readers as complete a set of details of cut stone work as those shown in Plates XXXVIII and XXXIX of this number. The new Post Office building in progress at Birmingham, England, is in charge of Henry Tanner, a member of the Royal Institute of British Architects, and a gentleman of high attainments in his profession. The plate reproduced herewith is self-explanatory, and will afford the stonemasons among our readers the opportunity of seeing features of practice that cannot fail to interest them. The design is characteristic of modern English work, and accordingly will be of value to our readers in general.

Plate XL contains a house design and floor plans by Thomas H. Rogers, of Parsons, Kan., which are described in our Correspondence department.

THE REPORTS of the slate business from Bangor and Penn Argyle, Pa., are most excellent the present season. Auld & Conger, of Cleveland, Ohio, who are prominent operators in the Bangor district, we learn, have been producing over 5000 squares of roofing slate a month, and have yet been unable to meet the demand that has been made upon them. The Bangor Slate Company report an export order of 5000 squares, and John Galt & Son, of New York, who are also operating quarries in that region, have an export order of 2000 squares. It is asserted that in 18 years past the trade has not seen as flourishing a season as at present.

WHEN ONE READS of a wind storm it is only natural to expect that there will be some mention made of the number of tin roofs that have been torn off. Such is not always the case, but then it may be some satisfaction to the roofer to know that there are others in trouble besides him. "Misery loves company." The following short and rather poetical extract from an exchange may interest the reader that is in the roofing business: "Wind stripped the entire brick veneer from the side of a building in Depere, Wis."

Heating a Dwelling-House by Hot Water.

In connection with the manufacture of the Perfect Hot Water Heater, the Richardson & Boynton Company, 232 Water street, New York, publish a valuable little pamphlet under the title "General Directions and Instructions Regarding the Subject of Heating by Hot Water Circulation." The pamphlet includes a number of cuts which illustrate the system of piping for hot water and the arrangement of radiators, and full descriptions accompany them. We are indebted to the Richardson & Boynton Company for the cuts presented herewith, as well as for permission give better results, greater satisfaction and consume less fuel.

DWELLING.

To heat a country house of two stories, facing the East, having an outside frontage of 37 feet and an outside depth of 40 feet, with an extension 22 x 29 feet; the ceiling on the first floor 10 feet and second floor 9 feet. On the first floor, Fig. 2, is a hall, 8 x 38 feet, running through the center the full length of the main building, having an open stairway to second floor.

Double parlor on the left of hall, 13 x 38, having a southern exposure of 38 feet and an eastern exposure of 13 feet.

Sitting-room on the northeast corner, 13 x 20, having an exposure of 20 feet on the north and 13 feet on the east.

room, and each radiator should have 1½-inch flow and return pipe.

The sitting-room contains 2600 cubic feet of air space, and should have 105 square feet of radiator surface, which is 4 square feet to the 100 cubic feet of air space. This can be placed in one radiator, with 1¼-inch flow and return pipe. Or, if space will not permit, it can be divided into two radiators of 65 and 40 feet, with 1¼ flow and return pipe to large radiator, and 1 inch to small radiator.

The library contains 2210 cubic feet of air space, and should have 88 square feet of radiating surface, which is 4 square feet to the 100 cubic feet of air space. The radiator should have 1¼-inch flow and return pipe.

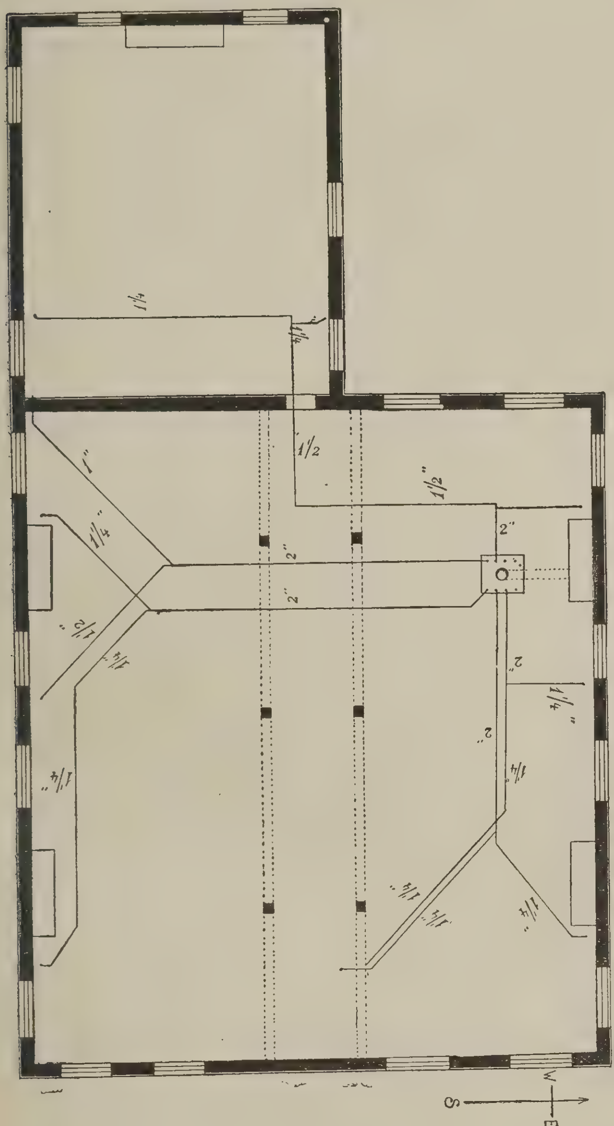


Fig. 1.—Basement Plan, Showing Flow Mains.

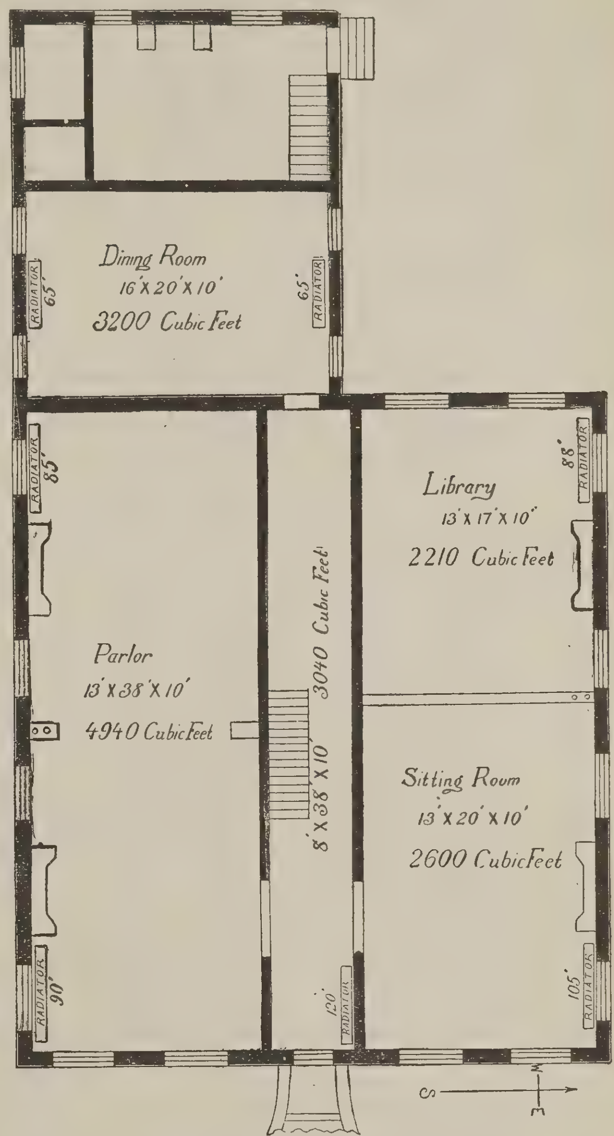


Fig. 2.—First-Floor Plan.

HEATING A DWELLING-HOUSE BY HOT WATER.

to arrange and compile from their pamphlet the following description of heating a dwelling, with the general information accompanying it: To illustrate how to estimate radiating surface we will describe a dwelling with the necessary radiating surface, size of heater, mains, &c., which, if properly placed, will thoroughly heat them. These figures are based on well-built buildings with ordinary exposure. In poorly built buildings, greatly exposed, or having larger windows than usual, the radiating surface would have to be increased. In buildings which are protected on two sides it can be slightly decreased. But as a little too much radiating surface is a good fault in a hot-water apparatus where you have boiler surface sufficient to heat it, ample radiating surface should always be figured, as it will

Library, 13 x 17, on northwest corner, having 17 feet exposure on the north and 13 feet on the west.

Dining-room, in extension, 16 x 20 feet; protected on the west by kitchen and pantry, and having an exposure of 16 feet on north and south sides.

On the second floor, Fig. 3, four bedrooms, 13 x 17, with closets between, each bedroom having two exposures, except the southwest room, which has only a southern exposure.

A hall, 8 x 38, with an eastern exposure of 8 feet.

A bathroom in extension, 6 x 12 feet.

The parlor contains 4940 cubic feet, and should have 175 square feet of radiating surface, which is 3½ feet to 100 cubic feet of air space. This should be placed in two radiators, at exposed sides of the

The dining-room contains 3200 cubic feet of air space, and should have 130 square feet of radiation, which is 4 square feet to 100 cubic feet of air space. This should be divided into two radiators of 65 square feet each, located on exposed walls; and each radiator should have a 1¼-inch flow and return pipe.*

The first floor hall contains 3040 cubic feet of air space, and should have 120 square feet of radiating surface, which is 4 square feet of radiation to 100 cubic feet of air space. This radiator should be located near main entrance, and should have 1¼-inch flow and return pipes.

* One-inch pipe for radiator of 50 square feet or less; 1¼ inch for larger ones to 125 square feet; 1½ inch from 125 square feet to 250 square feet.

The second floor hall contains 2736 cubic feet of air space, and should have 82 square feet of radiating surface, which is 3 square feet of radiating surface to 100 cubic feet of air space. The radiator should be located near exposed end of hall, and should have 1¼ inch flow and return pipes.

Each of the second floor bedrooms contains 1989 cubic feet of air space, and should have radiators of the following sizes: northeast bedroom, 65 feet, which is 3¼ square feet to 100 cubic feet of air space.

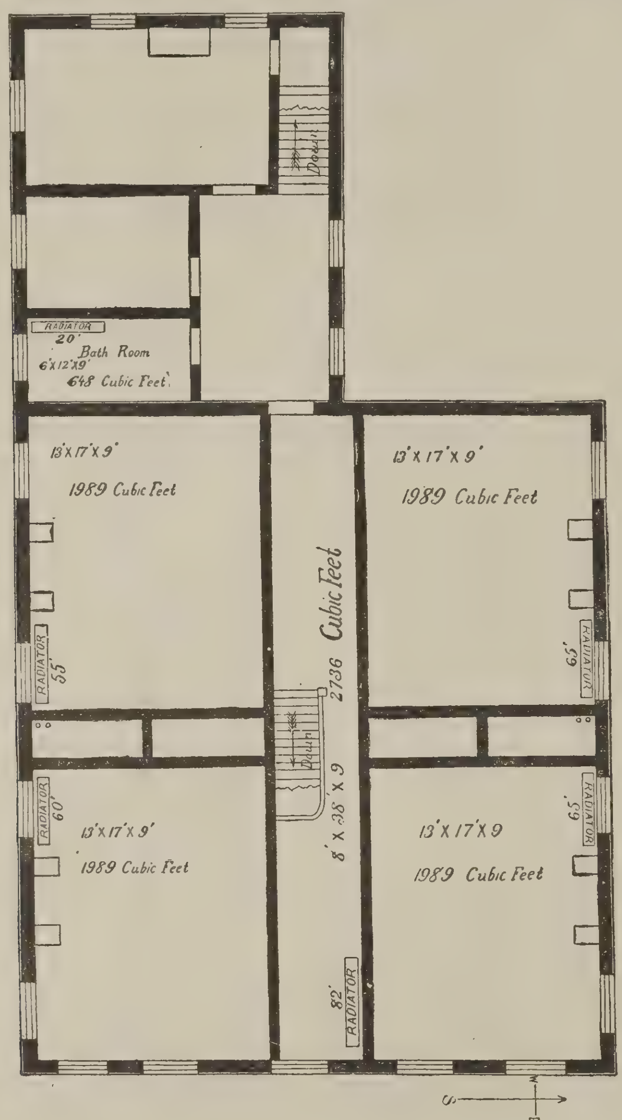
Northwest bedroom, the same as northeast.

The total radiating surface required in building is 965 square feet. This would require a No. 5 Perfect heater.

The heater should be located in the basement, Fig. 1, as near the center of main building as flue will permit, and mains run as follows:

MAINS.

One 2-inch flow and return main to supply library and dining-room radiators, reducing by a 2 x 1½ x 1¼ inch tee. Where 1¼ connection is taken off to supply library, and 1½ pipe pipe to supply dining-room radiators, branching off to each radiator with a 1½ x 1¼ x 1¼ tee.



Hot-Water Heating.—Fig. 3.—Second-Floor Plan.

Southeast bedroom, 60 square feet, which is 3 square feet to 100 cubic feet of air space.

Southwest, 55 square feet, which is 2¾ square feet to 100 cubic feet of air space.

These four radiators should be located on exposed sides of rooms; and each radiator should have 1¼ inch flow and return pipe.

The bathroom in extension contains 648 cubic feet of air space, and should have 20 square feet of radiating surface, which is 3 square feet to 100 cubic feet of air space. This radiator should be located near exposed end of room, and should have 1 inch flow and return pipe.

Expansion tank should be located in bathroom, high enough to give head room. If there are no valves on mains at heater it can be connected with 1 inch pipe to return pipe from bathroom radiator. If there are valves on mains at heater, the expansion tank *must* be connected direct to return of heater inside of valves.

One 2-inch flow and return main to supply parlor radiators, branching off to each radiator with a 2 x 1¼ x 1¼ tee.

One 2-inch flow and return main to supply hall and sitting-room radiators, branching off with a 2 x 1¼ x 1¼ tee if one radiator is used in sitting-room, or, if two radiators are used in sitting-room, branching off with a 2 x 1¼ x 1½ tee. Supplying sitting-room radiators with a 1½-inch branch, branching off to the radiators with a 1½ x 1 x 1¼ tee. Supplying large radiator with 1¼ pipe, and small radiator with 1 inch.

One 2-inch flow and return main to supply second story hall, northeast and northwest bedrooms, second floor, branching off in basement with 2 x 1½ x 1¼ tee. Supply hall radiator, second floor, with a 1¼ inch flow and return riser, carried up in partition between sitting-room and hall or on face of partition in hall. Supply northeast and northwest bedroom radiators with 1½-inch flow and return riser, carried up in partition between library and sitting-room, branching off to each radiator with a 1½ x 1¼ x 1¼ inch tee.

One 2-inch flow and return main to supply bathroom and southeast and southwest bedrooms, second floor, branching off in basement below parlor with a 2 x 1½ x 1 tee, to supply bathroom radiator. Carry the 1-inch flow and return-pipes to bathroom radiator up in box with plumbing work in corner of dining-room. Supply the southeast and southwest rooms with a 1½-flow and return riser, carried up in pillar of arch on south wall of parlor, branching off to each radiator with a 1½ x 1¼ x 1¼ tee.

The water supply should be connected to a tee in pipe connecting bottom of expansion tank with system. A convenient place for it is about one foot below the tank. It must have a valve or stop-cock on it at this point. Where a third floor is heated, the expansion tank should be located on third floor, in any of the rooms or hall, 2 feet or more above the radiators; having a 1-inch connection to return of radiators, or to return of heaters if valves are used on mains. In cases where there is no water supply a self-closing cock and funnel should be placed in side opening of tank to supply apparatus.

An indirect stack of 75 to 100 square feet is sometimes placed below main hall for the purpose of ventilation. It is usually cased with a tin-lined pine box, and connected to hall by means of a tin-lined hot-air pipe and register, and has a cold-air box of about two-thirds the area of the hot-air pipe, with a valve for the purpose of controlling the supply of cold air.

Air valves must be placed on all radiators or coils at the highest point, which should be opened until the water comes, then closed, following them up from one floor to another to the top of system. This allows for the escape of all the air in the pipes and radiators, and which it is necessary to draw off while the pipes and radiators are being filled with water. Then, upon building a fire in the heater, the circulation of water begins at once. If there is a trap, caused by a collection of air in the radiators or pipes, the water will not circulate. Hence the importance of this, as air in pipes presents as great an obstruction as if the pipe was solid. If the mains are in a warm cellar it is not absolutely necessary to cover them. But if the mains and returns are placed in a cold cellar, or wherever they are exposed to a cold circulation of air, it is very important that they should be covered with thin asbestos paper and ¾-inch hair felt sewed in canvas.

Always allow water to remain in the pipes during the summer, as it keeps out the air and avoids corrosion. By doing this the pipes will be kept in perfect condition for a great many years. It may be desirable every fall, before starting the fire, to draw off all the water and replenish the whole system with pure water, but it is not necessary. In fact, if there are no obstructions it is best to use the same water, it being freer from alkali than a fresh supply might contain.

As water in a hot-water heater system will naturally evaporate some, it is best to look at the supply of water in the expansion tank, and fill up the same with whatever water is required about once a week. In a steam heater this has to be attended to daily, but in a hot-water apparatus once a week is sufficient.

In first firing an apparatus, should the water in any of the radiators not circulate, it shows that the piping is defective and traps formed, causing air-pockets; or that pipes are obstructed by air or dirt; or the air is formed from air-cocks being placed too low on radiators or coils, thus preventing the escape of air; or the expansion tank not connected with the return-pipe; or flows and returns being of insufficient size, or placed in wrong position; or that

the mains do not have a continuous upward inclination, or the returns do not have a continuous downward inclination.

EXPANSION TANK.

The size of expansion tank should be proportioned to the size of the heater, number square feet of radiation, and size and length of mains in use.

They should be made cylindrical in form, with closed top, of boiler iron or steel, fitted with glass water gauge, so as to tell the amount of water in the tank.

Allowance must be made in every case for an expansion of one-twenty-third of the volume of water in the system.

These tanks can be placed in any convenient part of the house, above the highest radiator, and should be kept about half full of water at all times. This is accomplished by filling by hand, or connecting with the city main or reservoir; or the tank can be connected and filled with a ball and cock, thus maintaining the same water level constantly, and requiring no attention whatever. In cases where no valves are placed on the mains the expansion tank can be connected to the return pipe from the highest radiator or coil, never on the flow-pipe.

Where valves are placed on the mains the expansion tank must be connected to the heater by means of ¾ or 1 inch pipe to the return connection or heater below the valves. This is, in all cases, the better way to connect the expansion tank.

The overflow-pipe must be led from the expansion tank to sink or drain connection, with trap in the basement, with vacuum valve in same at the tank; or it may be led into a tank or sink on the upper floor.

This is necessary in cases where, for instance, radiators may be closed off on account of heat not being desired, and yet, through carelessness, a strong fire kept up, which would cause boiling and overflow of the water; hence these connections are necessary for safety.

VALVES.

Never use globe valves. Always use angle or gate valve for connections on the mains or to shut off or reduce the circulation of water in the radiators.

In cases where it is desirable or necessary to close off and drain off a section of the apparatus, flow and return mains at heater should have a gate valve placed convenient, so that the heat can be shut off from any section of the heater systen when desired. It is also necessary to have a draw-off valve placed on mains further away from the heater than gate valve. This is a provision to enable the draining of one entire main without the necessity of shutting the heat off the whole building. In drawing off the water from the mains or heater always open all the air valves on radiators.

A draw-off cock is also necessary, placed at the lowest point on the heater, so as to empty the entire system—heater, pipes and radiators—of water when desired. As, for instance, if the building is to be vacated during cold weather, or, say, for a week during the cold weather, or if the house is to be unoccupied. It is to provide for these things that this is essential.

To heat a detached house, the following square feet of radiators to each 1000 cubic feet of air space is necessary.

In very cold Northerly sections these figures to be increased, and in warmer sections decreased.

	Frame.	Stone or Brick.
Parlor or first floor	35	30
Second floor	30	25
Third floor	25	20

For city house:

	Frame.	Stone or Brick.
Basement	30	25
First floor	35	30
Second floor	30	25
	Frame.	Stone or Brick.
Third floor	25	20
Fourth floor	20	20

For heating a church:

	Frame.	Brick or Stone.
Basement	25	20
First floor	30	25

Radiators in churches should be placed with a view to two things. First, placing them at the exposed parts, under the windows particularly, on account of there being a tendency to a down draft. Also at the entrance; and many times it is advantageous to so place them that people on entering the church can gather around the radiators for warming before taking their seats.

For heating schoolhouses. Radiators being placed generally under windows:

	Frame.	Brick or Stone.
First story	40	35
Second story	35	30
Halls	40	35

All radiators on the first floor above hot water heater must be supplied by independent main or mains running to that floor alone, having no connection with radiators on the floor or floors above. This is a vital point.

In special cases, however, where it would be necessary to carry a long line of pipe from heater to supply a single small radiator on second floor, it is possible to supply same from first floor main by taking the riser to second floor from side opening of a reducing tee on vertical pipe supplying first floor radiator, and not from horizontal main, but while this will answer in special cases, it should be avoided as far as possible.

Cast-iron fittings should be used on all flow and return mains.

Malleable fittings should not be used.

Union couplings should not be used on mains, risers or connections. Right and left connections make better work, and when properly put together will not leak.

PIPING.

	Can be taken.
From a 2 inch main three	1¼ inch risers
or one 1½ and one	1¼ " "
or one 1¼ and one	1 " "
or four	1 " "
From a 1½ inch main two	1¼ " "
or one 1¼ and one	1 " "
or three	1 " "
From a 1¼ inch main two	1 " "

The risers as given above can be divided further on the floors above, thus: A 1½-inch riser might take the second and third story radiators. After feeding the second story radiator it should be reduced to 1¼ inch by a 1½ x 1¼ x 1¼ tee and continued to the third story. Radiators on second floor to be supplied from top of tee with a nipple and elbow, riser for third floor to be taken from side branch of tee, or a 1½-inch riser could be placed to supply third and fourth floors. Radiators dividing on third floor with 1¼ x 1¼ x 1¼ tee, supplying radiators on third floor from top of opening of tee with nipple and elbow. Each radiator on third floor to be supplied with a 1-inch pipe branching from a 1¼-inch pipe by using 1¼ x 1 x 1 tee, continuing a 1¼-inch riser from side opening of tee on third floor to supply radiators on fourth floor, each radiator to be supplied with a 1-inch pipe, branching from 1¼-inch pipe with 1¼ x 1 x 1 tee joint on fourth floor. Always taking risers for upper floor from side branch of tee, when practical, while supplying radiators on floor below from the top of the tee with nipple and elbow.

All branches from horizontal flow and return mains in basement should be taken from top of main, using a reducing tee, a nipple and an elbow.

By mains we mean the flow and return pipes which leave the heater, and are located in the cellar. The main flow and main return pipes should be the same size and have the same size fittings.

The risers are the branches from the main flow and return pipes, leading to the radiators or coils, and are either flows or returns.

CAPACITY OF PIPES.

	Radiator surface.
36 in. in length of 1 in. pipe =	1 square foot.
28 in. in length of 1¼ in. pipe =	1 " "
24 in. in length of 1½ in. pipe =	1 " "
20 in. in length of 2 in. pipe =	1 " "

When piping is used for radiators manifolds should be employed. Have connection of sufficient capacity to supply radiators.

1 in. connection will supply 50 ft. of radiator.
1¼ in. connection will supply 125 ft. of radiator.
1½ in. connection will supply 250 ft. of radiator.
2 in. connection will supply 400 ft. of radiator.

Each square foot of radiator surface is equal to 3 feet of 1 inch pipe.

Generally radiators on the second and third floor or third and fourth can be heated by the same riser, and connected so that the same returns can be used.

Where two radiators of equal size are used on the same floor, one radiator being on each side of the same riser, always connect them, having the flows and returns of equal size. Never use crossway or bull-head tee joints on end of mains, risers or connections on hot-water work; in reducing the size of a main always use a reducing tee.

All main flows and branches from risers must have a *continuous rise*, of at least 1 inch in 10 feet, from heater, and the returns must have a continuous fall toward heater of one inch in 10 feet to prevent trapping. The mains and returns are generally run alongside of each other.

The proper fall toward heater for all flow and return mains in a hot water heating apparatus, where hight of basement ceiling will permit, is ½ inch to 1 foot.

The horizontal flow and return mains in basement should be suspended from basement ceiling with proper pipe hangers, and not with chain or wire, which will stretch, allowing pipe to sag and become air bound.

Where a radiator is desired on the same floor as furnace, a separate riser must be taken from heater to a convenient point; then carried up to ceiling of floor above the radiator, with an air chamber therein above tee, then down to the radiator. This is necessary to insure perfect circulation. As air will gather at the top of this air chamber, a small pipe is carried up and discharged into the overflow pipe above expansion tank. Or the air pipe is sometimes carried down alongside of the flow pipe to the side of the heater, and a pet cock placed thereon. The return pipe from radiator to the furnace can be run along or below the floor to the heater, where it enters the main return pipe on the side.

WE ARE INDEBTED to M. Ehret, Jr., & Co., 50 Dearborn street, Chicago, Ill., for a descriptive circular of Ehret's Black Diamond Prepared Roofing which they manufacture. The circular gives a full description with illustrations of this roofing, and points out its several merits. Inclosed in the circular were samples of a line of building papers carried by them. The specimens are: Manahan's Parchment, for sheathing and decorator's use; Diamond Brand Red Rosin Sized Sheathing and No. 1 Neponset Red Roofing Paper and the Neponset Waterproof Building Paper.

IT IS STATED upon good authority that negotiations have been in progress for some time past, looking to the purchase of the slate industry in the vicinity of Rockmart, Ga., and that arrangements have finally been concluded for the commencement of active operations. About 1000 men will be employed in developing the mineral interests in that locality.

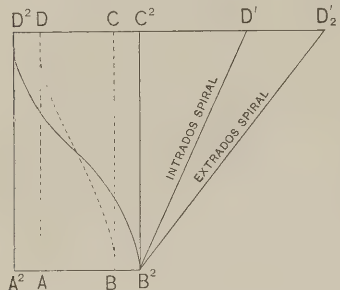
IMMIGRATION AT THIS PORT during the 12 months ended June 30 was larger than ever before, excepting the years 1881, 1882 and 1883. The total was 550,000 persons, which is 60,000 in excess of the previous year, and there are no signs of a decrease in the future.

Masonry.

Masonry and Stone Cutting.

(Continued from page 188, September.)

Since the joints are made to radiate in a direction perpendicular to the axis of the cylinder, it follows that the axial length of the intradosal and extradosal spirals will be the same. If (Fig. 42), starting from the same line, $B_2 C_2$, we unroll the surfaces of the extrados and the intrados, the surface of the extrados will unroll further than that of the intrados, and, consequently, the development of the extrados spiral will form a greater angle with $B_2 C_2$ than the development of the intrados spiral. In drawing the heading spirals in the development of the extrados they will not be perpendicular to the coursing spirals, nor will they pass through the intersections of the face and impost lines, but they will fall within the face at the obtuse,



Masonry.—Fig. 42.—Unrolling the Surfaces of the Extrados and Intrados.

and beyond it at the acute quoins (see Fig. 41). Divide the extreme heading spirals into as many equal parts as the heading spirals of the intrados, and through these divisions draw the developments of the extradosal coursing-joints. Transfer the divisions on the face-line of the extrados to the curve of the extrados in elevation (Fig. 41) and draw in the face joints between the points thus determined in the extrados and intrados. The face joints are not straight lines, but curves, as the intersection of a plane with a spiral surface is a curved line. An intermediate point might be found by developing an intermediate cylinder between the intrados and extrados.

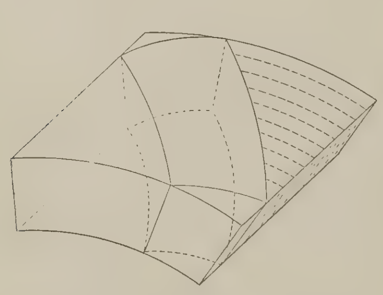


Fig. 43.—Working the Voussoir.

Focal Eccentricity.—In 1839 Mr. George W. Buck pointed out that the chords of the face joints of an oblique arch of equal thickness from the springing to the crown all radiate from a point below the axis of the cylinder, the distance of this point increasing with the angle of obliquity. This affords a very rapid and practical way of drawing the face joints; but as this construction is based on trigonometric reasoning we must refer the reader to Mr. Buck's "Practical and Theoretical Essay on Oblique Bridges."

The Molds for the Soffit and Extrados of the Skewbacks are found on the developments (Fig. 41); but there are shorter methods given by Mr. Buck which do not require to make these developments on a large scale.

In working the springers they are first brought into a cylindrical form and divided into the proper number of checks. The molds are then applied on the soffit and extrados, and their profiles marked on the stone, which is then cut away to these lines.

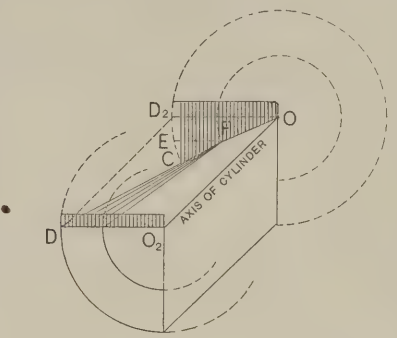


Fig. 44.—Cutting a Winding Surface from a Prism.

Absolutely Accurate Method for Working the Voussoir.—If absolute mathematical accuracy be required, and waste of stone be not considered, the method for cutting the voussoirs is very simple. First produce a cylindrical stone, as shown in Fig. 43, and with the help of the soffit and extrados molds draw on its inner and outer surface the outlines of the voussoir. Then, by a series of saw-cuts parallel to the ends of the cylinder and down to the outlines of the extrados and the soffit, you obtain

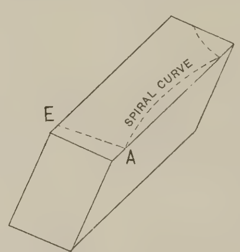


Fig. 45.—Working the Voussoirs of the First Bed.

drafts to guide you in working the spiral surfaces of the joints of the stone. This method will be found most practical for working the stones of small models, such as are made by the Guilds classes of masonry. The usual methods, apart from being but approximately correct, are only applicable to working stones of the usual dimensions; for instance, the twisting rules which we are going to describe are easily worked when their length is about 1 foot, but when reduced to only 1 inch they become very awkward. It is therefore advisable for students to work out a model by the simple method described above, and on the finished model study the operations usual in real practice.

Twisting Rules.—The surface of the bed-joints is produced by a straight line bound to remain perpendicular to the axis

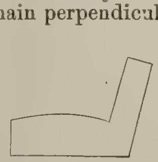


Fig. 46.—Templet No. 2.

of the arch, and to follow the spiral delineated on the soffit of the arch; it is therefore a—

Winding Surface.—The spiral has the property of having a constant ratio between the hight C K (Fig. 40) of any point and the portion of the circumference of the base A K, over which it stands; for instance, if L A $= \frac{3}{4}$ K A then D L $= \frac{3}{4}$ C K. It follows that to a length C D on the spiral, wherever taken, corresponds an arc, K L, on the base, and consequently that the projection of the rays C O and D O_2 comprise between them the angle K M L. To cut from a prism (Fig. 44) the winding surface C D O_2 O (Fig. 40) having worked D O_2 O D_2 to a plane and squared both ends of the prism, we need only place on the further end the segment C O D_2 (Fig. 44) = K M L (Fig. 40); then C O will be the further generator of the winding surface. If the distance O_2 O be sufficiently small, the portion D C of the spiral will practically be straight, and the winding surface can be considered as a paraboloid; to work this the rays D O_2 and C O will be divided in equal parts, and the surface will be worked with a straight-edge, connecting the corresponding points on the rays. Now we can obtain the guiding lines D O_2 and C O on a rough stone without having to work the surface D O_2 O D_2 to a plane. For this we use a pair of twisting rules; the one has parallel sides, the other has its lower edge diverging to the angle D_2 O C. When the rules are placed at the distance O_2 O from one another, and their upper edges are sighted so as to bring them in the same plane, the lower edge of the further rule will give the line C O. Thanks to this, a workman could cut a chisel draft at C O; then place the first ruler with parallel edges at C O, and the second twisting rule further on, at the same distance as before, so as to cut a second chisel draft, and so on, until he had sufficient chisel drafts to guide him for working the whole of a spiral surface.

Now the surface of a bed-joint of a stone is only a portion of the whole spiral surface produced in Fig. 44; it is comprised between the two concentric cylinders which form the extrados and intrados of the arch. The triangle E F C would then give the divergence of the twisting rules. To get this strip, we take, Fig. 41, a section of the arch at a distance, D N, from the angle of the impost equal to the distance between the twisting rules. On the section the line K Q is the elevation of one end of the bed-joint, whereas L N is the elevation of the other end. If we draw P Q parallel to L N, then the triangle K Q P will be the twisting strip.

Templet for the Curve of the Soffit.—The portion of a coursing spiral included in the length of a voussoir of moderate dimensions may be treated as an arc of a circle, and may be obtained by three points taken thereon. For instance, in Fig. 41 we can connect on the square section N Q the two ends of the intradosal spiral between the twisting rules, and draw a tangent to the cylinder parallel to chord N Q and touching the point S of the spiral. Turning down the plane which contains these parallels, we can draw an arc of a circle between the points. Call it templet No. 1.

Templet for Marking the Heading-Joints on the Beds.—Take a sheet of zinc and mark on it the curve of the soffit with templet No. 1. With intersecting arcs, set up a perpendicular to the curve as in Fig. 46. This is templet No. 2.

(To be continued.)

FOR A STRONG GLUE, which will hold in a damp place, the following recipe works well: Take of the best and strongest glue enough to make a pint when melted. Soak this until soft. Pour off the water as in ordinary glue-making, and add a little water if the glue is likely to be too thick.

When melted add three table-spoonfuls of boiled linseed oil. Stir frequently and keep up the heat till the oil disappears, which may take the whole day and perhaps more. If necessary, add water to make up for that lost by evaporation. When no more oil is seen a table-spoonful of whiting is added and thoroughly incorporated with the glue.

The Standard Contract.

We append the text in full of the standard form of contract adopted by the joint committee of the American Institute of Architects, the Western Association of Architects and the National Association of Builders. We preface it by the circular letter of the special committee of the National Association of Builders, which is self-explanatory :

CIRCULAR OF SPECIAL COMMITTEE ON UNIFORM CONTRACTS.

Among the earliest and most important matters brought before the National Association of Builders for its consideration was the question of "uniform contracts," and, at their first convention, held at Chicago, in March, 1887, a resolution was adopted to the following effect :

1. That it would be greatly to the advantage of interested parties if all blank forms of building contracts were uniform throughout the United States.

2. That such forms should be very carefully framed, in order that the interests of both owner and builder should be properly protected.

3. That the proper method to produce a document that would be practical and complete, and secure its general adoption when formulated, should be through the co-operation of the three bodies representing most comprehensively the parties at interest—viz.: The National Association of Builders, the American Institute of Architects and the Western Association of Architects.

Following out the suggestions of this resolution a "special committee" was appointed early in 1887, and instructed to take such steps as seemed most advisable. This committee held several conferences with the American Institute and Western Association, the final result of which was the appointment of special committees by both societies, to meet in joint conference with the committee of the National Association.

The committees were severally given authority to act in the matter on behalf of their respective associations, and to adopt a form of contract which should be known as the form approved by the three associations referred to.

The "Joint Committee" thus appointed and authorized at once entered upon its duties, and after much preliminary correspondence its members met in executive session in the city of New York and completed the work which had been delegated to them.

The result is conveyed to the individual members of the three bodies in the accompanying "specimen copy" of the form adopted, together with a "circular statement" of the Joint Committee.

The Special Committee of the National Association of Builders desires to call the particular attention of every member of that body to the importance and significance of the end accomplished.

This is the consummation of a much agitated measure, and one which for many years has been anxiously desired by architects as well as builders.

We now have a form which may properly be required by either builder or owner, it being the joint product of the two interests through their regularly organized associations—associations which represent in their membership all sections of the country.

This form may be demanded by either owner or builder as the proper basis of agreement, and (it being the usual and customary form, the provisions of which they will have had opportunity to become thoroughly familiar with) any alterations, emendations or additions may quickly be discerned and considered by either party before signing, they having the surety constantly before them that the copyrighted form as printed protects both their interests as comprehensively as possible.

It is hoped that builders will aid in establishing this form by requiring its use in all contracts they may be called upon to sign.

Congratulating the members of the National Association upon the success which has attended this effort to aid, assist and protect builders throughout the country, the committee respectfully submits that the advantage gained in this one direction is worth all the time, pains and expense which has been devoted to the association since its formation, and takes this opportunity to express the hope that every member will feel fresh interest in all its undertakings, and encourage the formation of filial bodies in such cities as are not at present represented, in order that future work may be still more representative and effectual.

EDWARD E. SCRIBNER, St. Paul, Minn.
JOHN S. STEVENS, Philadelphia, Pa.
JOHN J. TUCKER, New York, N. Y.
GEORGE C. PRUSSING, Chicago, Ill.
Special Committee on Uniform Contracts.

WM. H. SAYWARD, Secretary, Boston, Mass.

FORM OF CONTRACT.

THIS AGREEMENT, made the............... day of............in the year one thousand.... hundred and. .... by and between ....

........................part of the first part (hereinafter designated the contractor), and ....part of the second part (hereinafter designated the owner).

Witnesseth that the contractor , being the said part of the first part, in consideration of the covenants and agreements herein contained on the part of the owner , being the said part of the second part, do covenant, promise and agree with the said owner , in manner following—that is to say:

1. The contractor shall and will well and sufficiently perform and finish, under the direction, and to the satisfaction of............ architect (acting as agent of said owner), all the work included in the..................

....

agreeably to the drawings and specifications made by the said architect , and signed by the parties hereto (copies of which have been delivered to the contractor), and to the dimensions and explanations thereon, therein and herein contained, according to the true intent and meaning of said drawings and specifications, and of these presents, including all labor and materials incident thereto, and shall provide all scaffolding, implements and cartage necessary for the due performance of the said work.

2. Should it appear that the work hereby intended to be done, or any of the matters relative thereto, are not sufficiently detailed or explained on the said drawings, or in the said specifications, the contractor shall apply to the architect for such further drawings or explanations as may be necessary, and shall conform to the same as part of this contract, so far as they may be consistent with the original drawings, and in event of any doubt or question arising respecting the true meaning of the drawings or specifications, reference shall be made to the architect , whose decision thereon, being just and impartial, shall be final and conclusive. It is mutually understood and agreed that all drawings, plans and specifications are and remain the property of the architect .

3. Should any alteration be required in the work shown or described by the drawings or specifications, a fair and reasonable valuation of the work added or omitted shall be made by the architect , and the sum herein agreed to be paid for the work according to the original specification shall be increased or diminished, as the case may be. In case such valuation is not agreed to, the contractor shall proceed with the alteration, upon the written order of the architect , and the valuation of the work added or omitted shall be referred to three (3) arbitrators (no one of whom shall have been personally connected with the work to which these presents refer), to be appointed as follows: One by each of the parties to this contract, and the third by the two thus chosen; the decision of any two of whom shall be final and binding, and each of the parties hereto shall pay half of the expense of such reference.

4. The contractor shall, within 24 hours after receiving written notice from the architect to that effect, proceed to remove from the grounds or building all materials condemned by.........., whether worked or unworked, or take down all portions of the work which the architect shall condemn as unsound or improper, or as in any way failing to conform to the drawings and specifications, and to the conditions of this contract. The contractor shall cover, protect and exercise due diligence to secure the work from injury, and all damage happening to the same by......neglect shall be made good by......

5. The contractor shall permit the architect , and all persons appointed by the architect , to visit and inspect the said work or any part thereof, at all times and places during the progress of the same, and shall provide sufficient, safe and proper facilities for such inspection.

6. The contractor shall and will proceed with the said work, and every part and detail thereof, in a prompt and diligent manner, and shall and will wholly finish the said work according to the said drawings and specifications, and this contract, on or before the .... day of...............in the year one thousand ....hundred and...........(provided that possession of the premises be given the contractor , and lines and levels of the building furnished him, on or before the...........day of.................in the year one thousand ....hundred and ....), and in default thereof the contractor shall pay to the owner.................dollars for every day thereafter that the said work shall remain unfinished, as and for liquidated damages.

....

7. Should the contractor be obstructed or delayed in the prosecution or completion of the work by the neglect, delay or default of any other contractor; or by any alteration which may be required in the said work; or by any damage which may happen thereto by fire, or by the unusual action of the elements, or otherwise, or by the abandonment of the work by the employees through no default of the contractor , then there shall be an allowance of additional time beyond the date set for the completion of the said work; but no such allowance shall be made unless a claim is presented in writing at the time of such obstruction or delay. The architect shall award and certify the amount of additional time to be allowed; in which case the contractor shall be released from the payment of the stipulated damages for the additional time so certified and no more. The contractor may appeal from such award to arbitrators constituted as provided in Article 3 of this contract.

8. The contractor shall not let, assign or transfer this contract, or any interest therein, without the written consent of the architect .

9. The contractor shall make no claim for additional work until the same shall be done in pursuance of an order from the architect , and notice of all claims shall be made to the architect in writing within ten days of the beginning of such work.

10. The owner agree to provide all labor and materials not included in this contract in such manner as not to delay the material progress of the work, and in the event of failure so to do, thereby causing loss to the contractor , agree that.......... will reimburse the contractor for such loss; and the contractor agree that if........ shall delay the material progress of the work so as to cause any damage for which the owner shall become liable (as above stated) then..... shall make good to the owner any such damage—over and above any damage for general delay herein otherwise provided; the amount of such loss or damage, in either case, to be fixed and determined by the architect , or by arbitration, as provided in article 3.

11. The owner shall effect insurance on said .... work, in his own name and in the name of the contractor , against loss or damage by fire, in such sums as may from time to time be agreed upon with the contractor , the policies being made to cover work incorporated in the building, and materials for the same in or about the premises, and made payable to the parties hereto, as their interest may appear.

12. Should the contractor at any time refuse or neglect to supply a sufficiency of properly skilled workmen, or of materials of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements on........part herein contained, such refusal, neglect or failure, being certified by the architect , the owner shall be at liberty, after three days' written notice to the contractor , to provide any such labor or materials, and to deduct the cost thereof from any money then due or thereafter to become due to the contractor under this contract; and if the architect shall certify that such refusal, neglect or failure is sufficient ground for such action, the owner shall also be at liberty to terminate the employment of the contractor for the said work, and to enter upon the premises and take possession of all materials thereon, and to employ any other person or persons to finish the work, and to provide the materials therefor; and in case of such discontinuance of the employment of the contractor he shall not be entitled to receive any further payment under this contract until the said work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this contract shall exceed the expense incurred by the owner in finishing the work, such excess shall be paid by the owner to the contractor , but if such expense shall exceed such unpaid balance, the contractor shall pay the difference to the owner . The expense incurred by the owner as herein provided, either for furnishing materials or for finishing the work, and any damage incurred through such default, shall be audited and certified by the architect ,

whose certificate thereof shall be conclusive upon the parties.

13. And it is hereby mutually agreed between the parties hereto that the sum to be paid by the owner to the contractor for said work and materials shall be.................. .... subject to additions or deductions on account of alterations as hereinbefore provided, and that such sum shall be paid in current funds by the owner to the contractor in installments, as follows:

....

It being understood that the final payment shall be made within.....................days after this contract is completely finished, provided that in each of the said cases the architect shall certify in writing that all the work upon the performance of which the payment is to become due has been done to..........satisfaction; and provided, further, that before each payment, if required, the contractor shall give the architect good and sufficient evidence that the premises are free from all liens and claims chargeable to the said contractor ; and further, that if at any time there shall be any lien or claim for which, if established, the owner or the said premises might be made liable and which would be chargeable to the said contractor , the owner shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient to completely indemnify ....against such lien or claim until the same shall be effectually satisfied, discharged or canceled. And should there prove to be any such claim after all payments are made the contractor shall refund to the owner all moneys that the latter may be compelled to pay in discharging any lien on said premises, made obligatory in consequence of the former's default

14. It is further mutually agreed between the parties hereto that no certificates given or payment made under this contract, except the final certificate or final payment, shall be conclusive evidence of the performance of this contract, either wholly or in part, against any claim of the owner , and no payment shall be construed to be an acceptance of any defective work.

15. And the said owner hereby promise and agree with the said contractor to employ, and... ...hereby employ........to provide the materials and to do the said work according to the terms and conditions herein contained and referred to, for the price aforesaid, and hereby contract to pay the same, at the time, in the manner and upon the conditions above set forth.

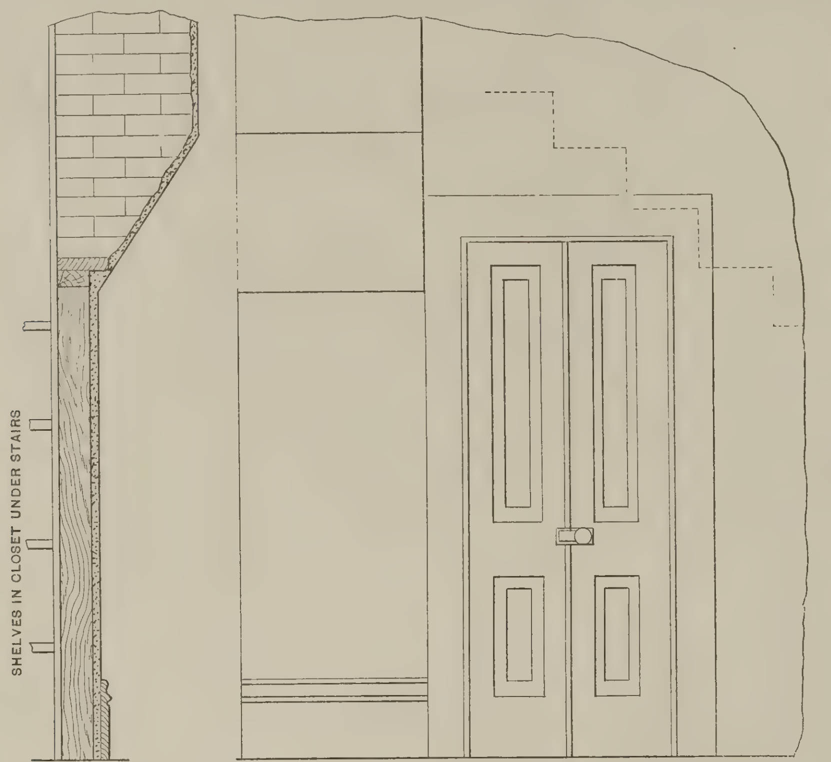
16. And the said parties for themselves, their heirs, executors, administrators and assigns, do hereby agree to the full performance of the covenants herein contained.

....

....

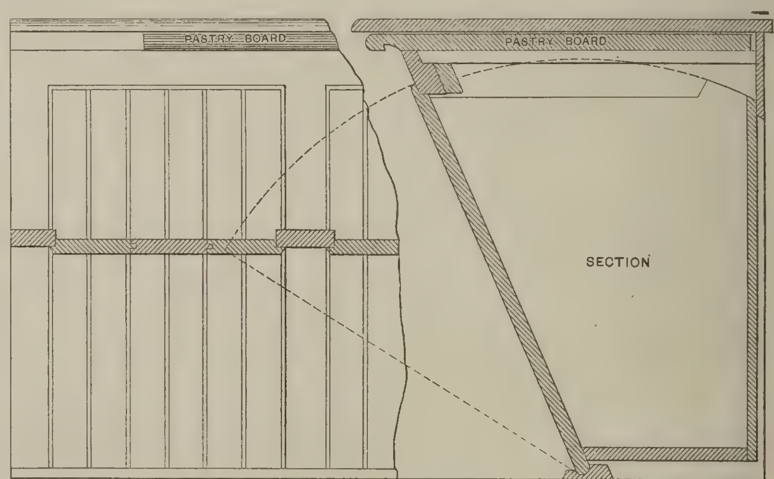
In witness whereof, the parties to these presents have hereunto set their hands and seals, the day and year first above written.

In presence of...................

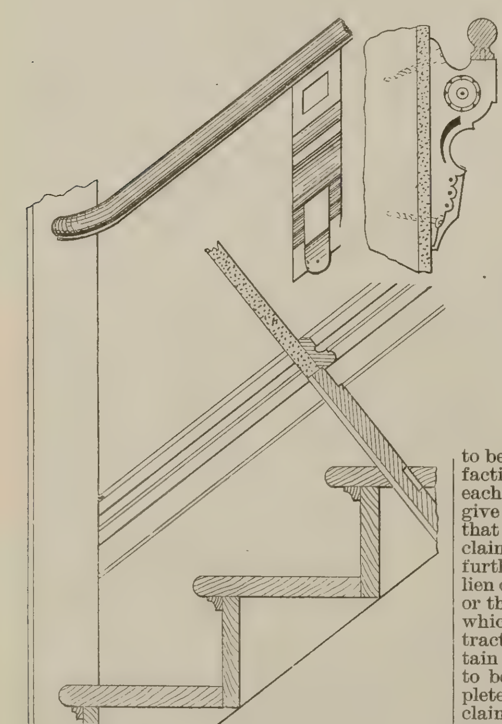


Five-Room Cottage.—Details of Closet under the Stairs.—Scale, ½ Inch to the Foot.

(For Elevations, &c., see Plate XXXVII.)



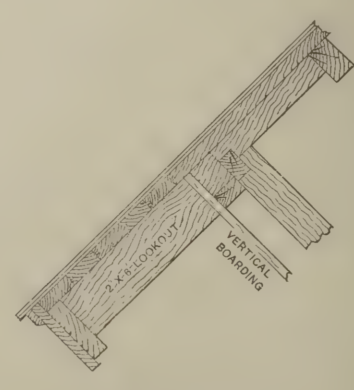
Details of Flour Bin in Pantry.—Scale, 1 Inch to the Foot.



Stairs and Hand Rail.—Scale, 1 Inch to the Foot.

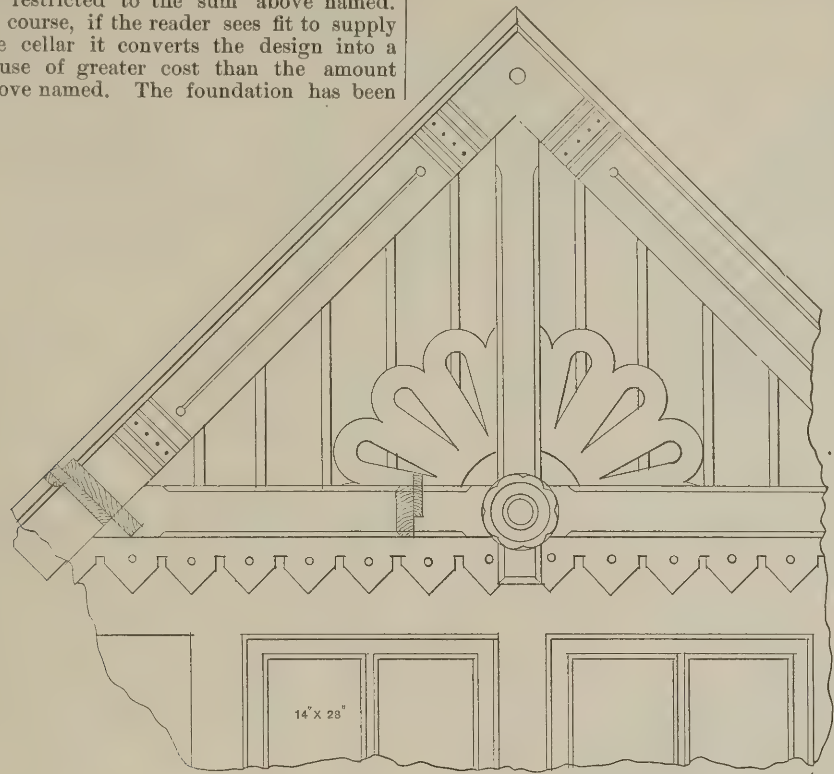
Five-Room Cottage.

The accompanying elevations, perspective view, plans and details represent a story and a half cottage, containing five rooms, designed by G. W. Payne, Carthage, Ill. The house meets some of the requirements which are frequently named by the readers of this journal, and, no doubt, the publication of this set of drawings will be generally acceptable to our subscribers. The author asserts in describing this study that he has kept in mind the fact that a client wanting a house costing $800 would be very likely to build on a farm or in a little village, or in the very outskirts of a city. He has therefore to do without the luxuries and elegancies of those who are able to spend a larger sum, and who, accordingly, are located where there are gas works, water works, &c. In omitting these conveniences, open fireplaces, weighted sash, &c., have also been omitted. What has been kept in mind is the attainment of a maximum of room compatible with safety, health and comfort and a proper regard for beauty in features of construction.



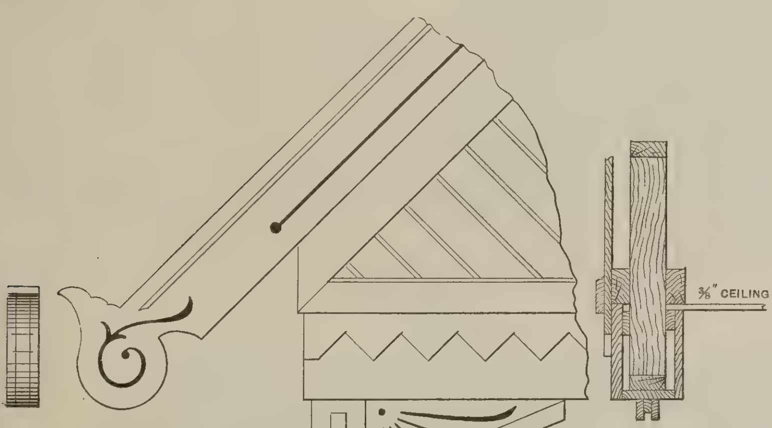
Section through Raking Cornice.—Scale, ½ Inch to the Foot.

The author states that he has omitted the cellar because its cost would take off one room from the house if the total cost is to be restricted to the sum above named. Of course, if the reader sees fit to supply the cellar it converts the design into a house of greater cost than the amount above named. The foundation has been

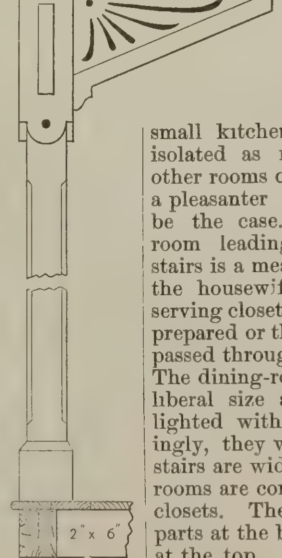


Details of Front Gable.—Scale, ½ Inch to the Foot.

obtained by excavating 2 feet deep and 1 foot wide, making the trench smooth.



Details of Porch.—Scale, ½ Inch to the Foot.



This has been filled to the top of the ground with concrete and finished with six courses of hard burned brick made perfectly level on top. On this is bedded a 2 x 8 wall-plate and on this in turn are laid the first-floor joists, placed 16 inches between centers, as shown in the foundation plan. Side studs are placed beside the joists and are spiked fast and toe nailed to the wall-plate. This construction, the author claims, makes a better job than can be secured by using sills. The lower story of the building is weather-boarded, using 1-inch lumber tongued and grooved together and nailed with tenpenny nails. This, he says, makes the walls as rigid as though they were sheathed and sided in the usual way. Other features of construction are very clearly shown in the drawings and do not require special description. As to the arrangement of rooms, the author says he has a small kitchen abounding in closets and isolated as much as possible from the other rooms of the house, thus making it a pleasanter home than would otherwise be the case. The door in the dining-room leading to the closet under the stairs is a means of saving many steps to the housewife. This may be used as a serving closet from the kitchen. The food prepared or the dishes to be washed may be passed through it to and from the kitchen. The dining-room and sitting-room are of liberal size and each of them is well lighted without outside doors; accordingly, they will be easily warmed. The stairs are wide and easy and the sleeping-rooms are commodious and provided with closets. The chimney, which starts in two parts at the bottom, ends in a single stack at the top.

A CORRESPONDENT of the United States *Army and Navy Journal* asks: "What is the longest piece of ordnance that has ever been successfully fired?" and receives the following answer. "If you include in the term ordnance everything that carries a projectile, we should answer 14 miles. This is the straight tube conveying natural gas from Murrayville to Pittsburgh. To clear this tube out a projectile known as the 'gum-ball' was inserted in the end at the gas well, closely fitting the interior; the gas was then turned on full force and the gum-ball fired through its full length, coming out at the further end in a few minutes.

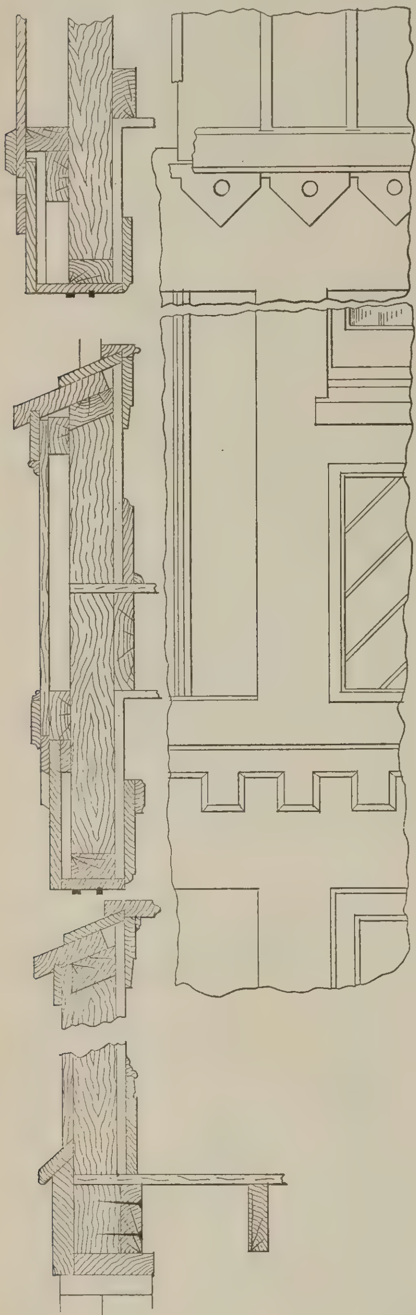
The Roofers' Strike.

The present strike of roofers in New York City is the result of a refusal on the part of the "bosses" to sign a new agreement with the men extending or renewing the old contract, which expired by limitation the 1st of May last. The bosses at that time declined renewing it, and, although its provisions, both as regards wages and other matters, have been recognized and enforced in the interval, the men are dissatisfied and demand a written agreement. At the outset the men wanted an increase of wages from $3.50 to $4 a day, but, realizing that the condition of the building trade did not warrant such an increase, this demand was withdrawn and the old rate allowed to be continued. The objection which the bosses have to the agreement as presented is that it makes no discrimination as to grades of labor. All must receive the same rates. The skillful worker, turning out more and better work than the unskilled man at his side, receives no more pay than his inferior. Accordingly, upon this plan, there is no incentive to excel in the trade, but, on the

Interior Finish of Sitting Room.—Scale, ½ Inch to the Foot.

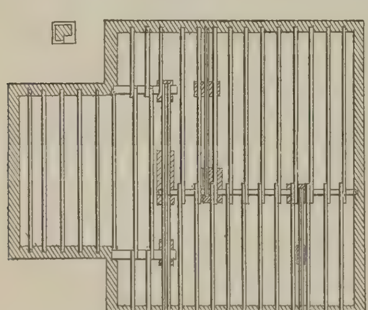
other hand, there is a tendency to bring all to a common level, and that, too, to a very low level—the level of mediocrity. The bosses claim that labor is a commodity, subject to the laws of supply and demand, and, therefore, decline to bind themselves to pay, during a period of inactivity and abundant labor, the wages

that are current when trade is active and labor scarce. On the other hand, the workmen claim their right to an agree-



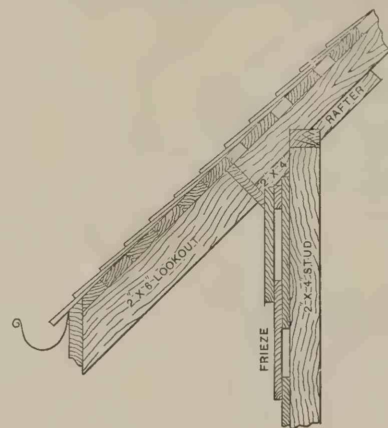
Vertical Section through Front Gable.—Scale, ¾ Inch to the Foot.

ment binding upon both parties. They claim that the equality of wages demanded



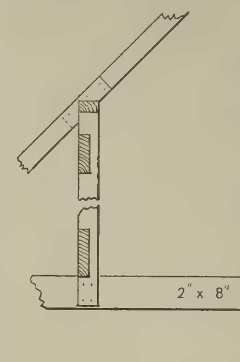
Foundation Plan.—Scale, 1-16 Inch to the Foot.

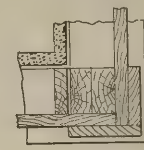
is the fairest during times of dullness; for then the best men are kept and the poorer ones are laid off. The result is that the latter class receive, on an average, much lower wages than the former, and, ac-



Vertical Section through Cornice.—Scale, ½ Inch to the Foot.

cordingly, the incentive of better pay remains to urge men to acquire proficiency in their trade. The workmen deny that labor is a marketable commodity, like iron, coal and materials in general, and assert that "the laborer is worthy of his hire," and that it is only through organized association that they can prevent labor being made a commodity. They claim that all the ordinary operations of existence con-

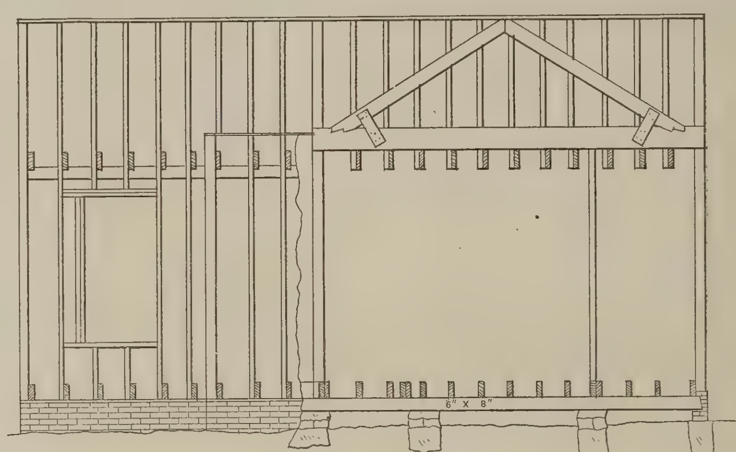




Corner Section.—Scale, 1 Inch to the Foot.

Section through Truss Over Kitchen and Dining-Room.—Scale, ¼ Inch to the Foot.

tinue in dull times as well as in brisk times, and must be provided for. Up to the time of this writing none of the bosses who are members of the employers' or-

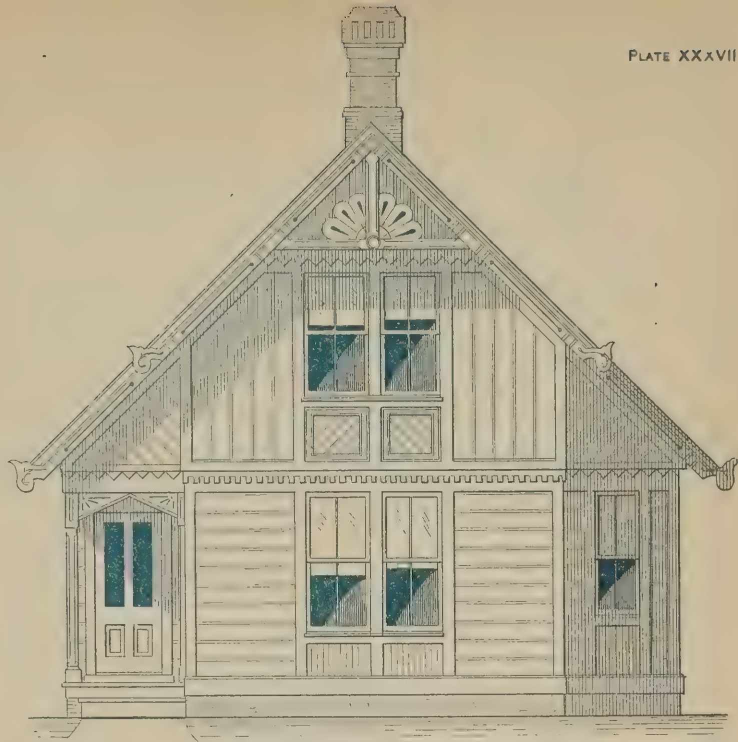


Timber, Elevation and Section through Kitchen, Showing Truss.—Scale, ⅛ Inch to the Foot.

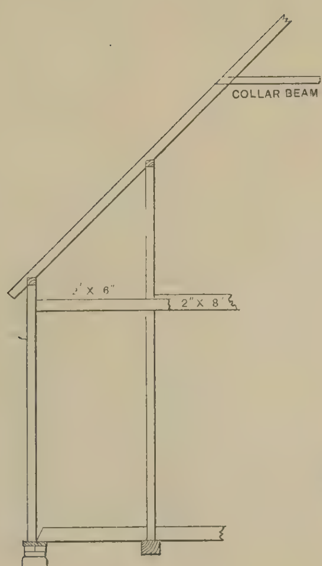
ganization have signed the agreement, and, so far as we can learn, they are unanimous in their declaration that they will not sign.

Right Elevation.—Scale, ⅛ Inch to the Foot.

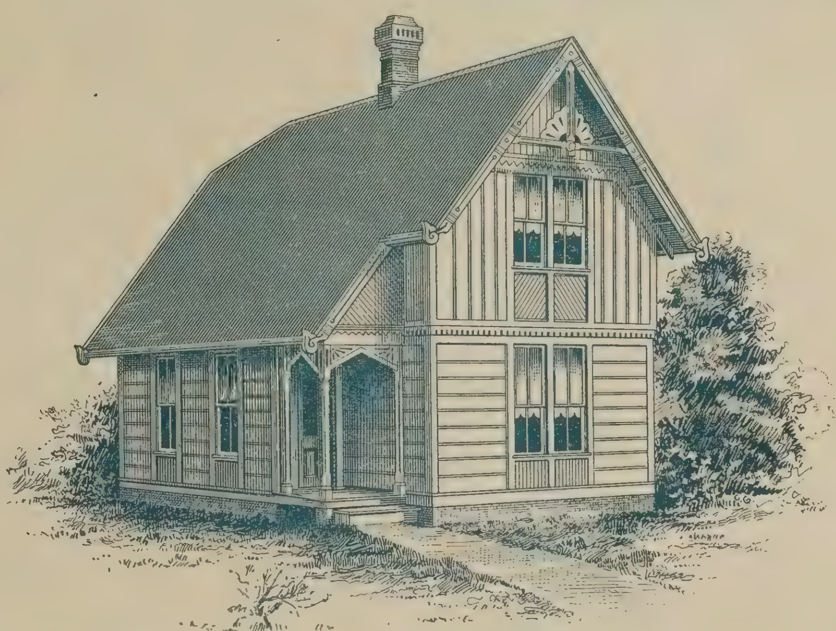
FIRST FLOOR PLAN.
Scale, 1-16 Inch to the Foot.



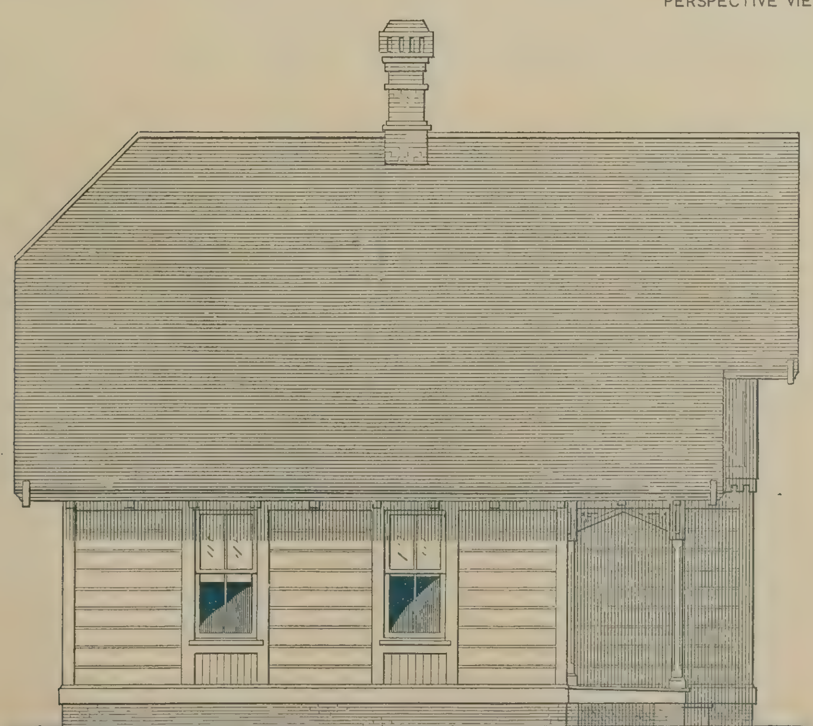
FRONT ELEVATION. Scale, 1-8 Inch to the Foot.



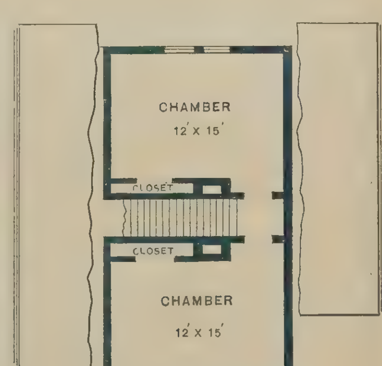
SECTION OF FRAMING.
Scale, 1-8 Inch to the Foot.



PERSPECTIVE VIEW

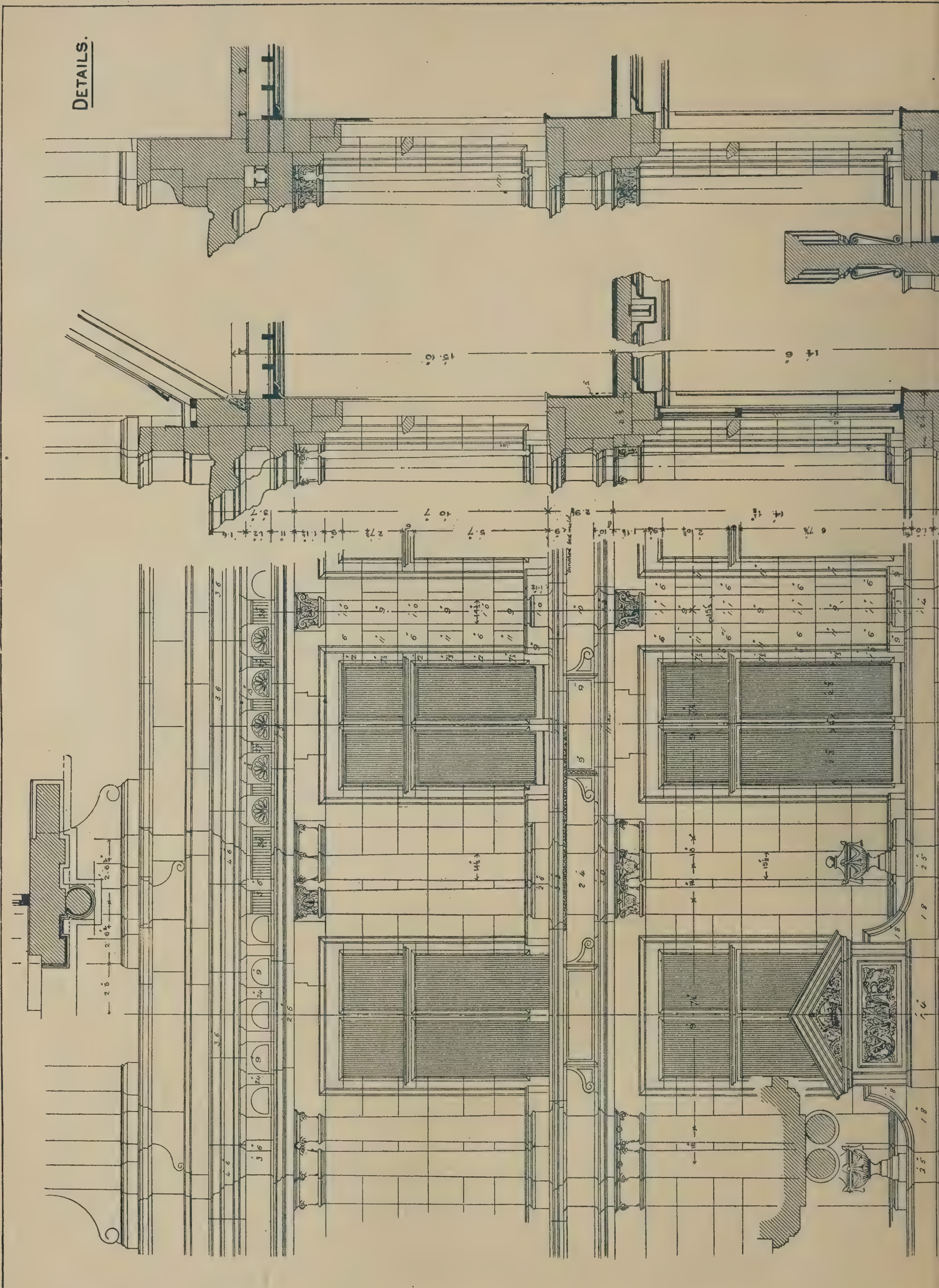


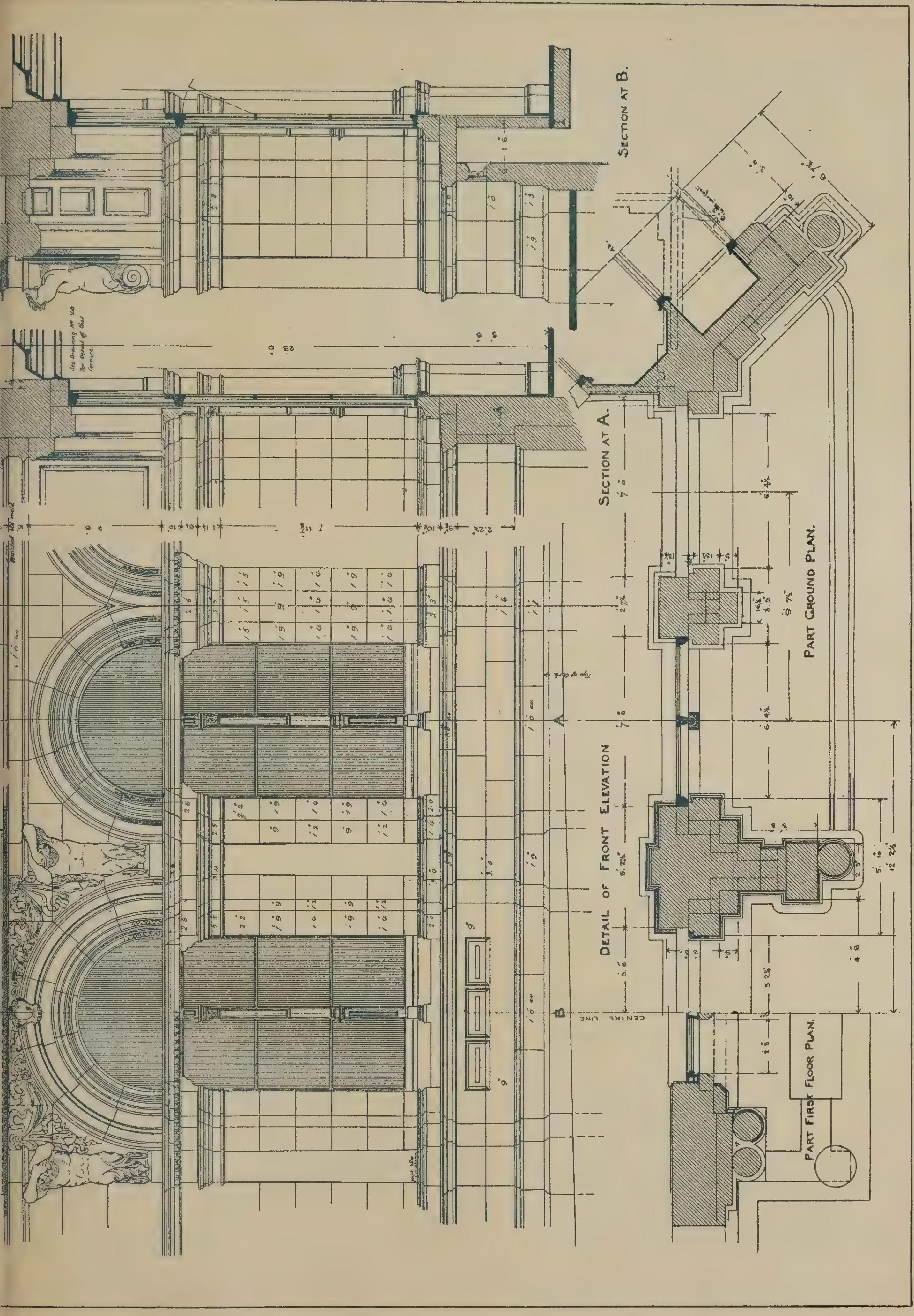
LEFT ELEVATION. Scale, 1-8 Inch to the Foot.



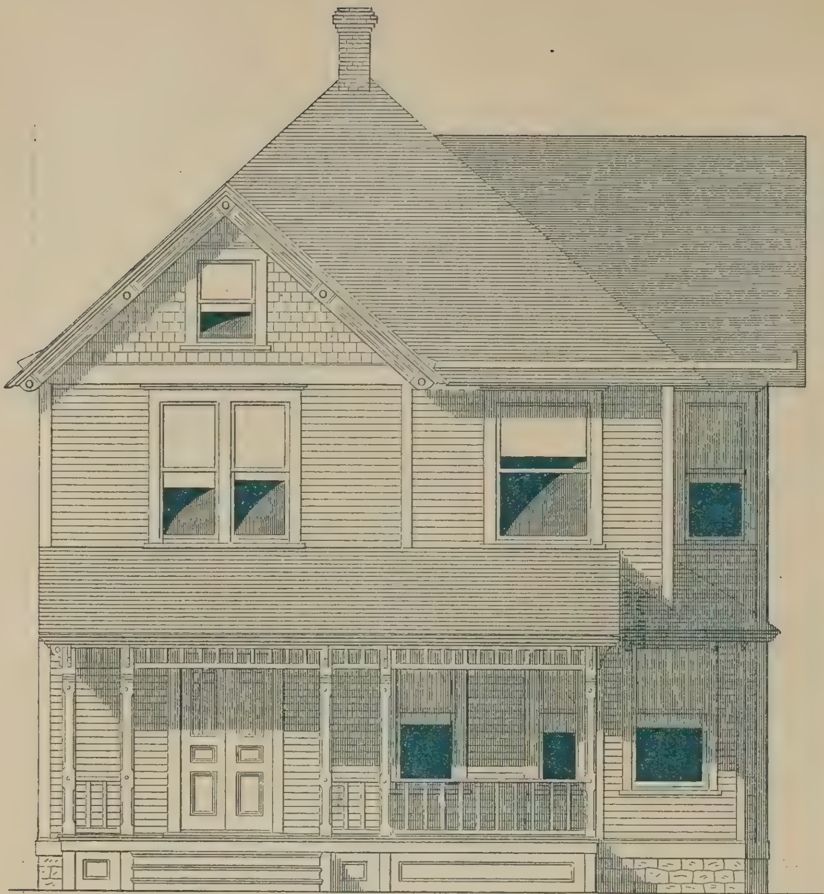
CHAMBER PLAN.
Scale, 1-16 Inch to the Foot.

FIVE-ROOM COTTAGE. Designed by G. W. PAYNE, Carthage, Ill.

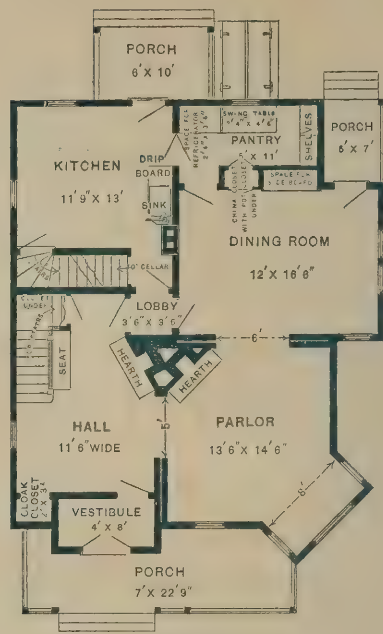

DETAILS.



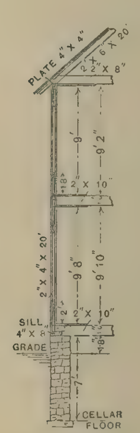
DETAILS OF CUT STONE WORK. NEW POST OFFICE, BIRMINGHAM. HENRY TANNER, ARCHITECT.



FRONT ELEVATION. Scale, 1-8 Inch to the Foot.



FIRST FLOOR.
Scale, 1-16 Inch to the Foot



SECTION.
1-16 Inch Scale.

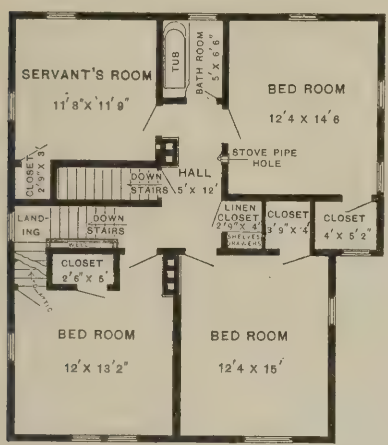
SIDE ELEVATION. Scale, 1-8 Inch to the Foot.

HOUSE DESIGN BY THOMAS H. ROGERS, PARSONS, KANSAS.

CORRESPONDENCE.

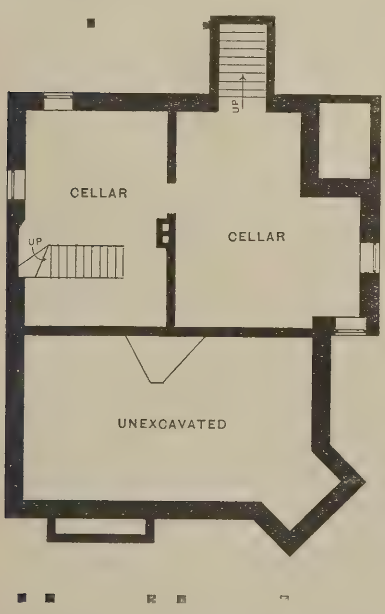
Study in House Planning.

From T. H. R., *Parsons, Kan.*—I take the liberty of sending you in this mail blue prints of a house plan which I have been at work on at odd moments for some time, and for which I am indebted considerably to *Carpentry and Building.* I have always taken great interest in planning of houses, and have been drawing plans at different times, commencing when quite a boy, and although I had no idea



Second Floor.—Scale, 1-16 *Inch to the Foot.*

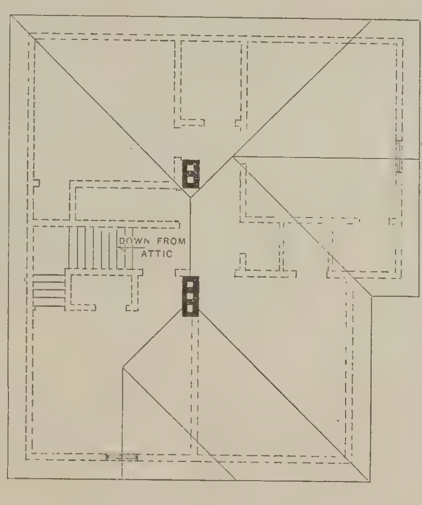
as to the requirements as regard dimensions of timbers, &c., within the past two years I have taken every opportunity to visit buildings in process of erection, and by chance I received a copy of *Carpentry and Building.* The plans seemed to be so much better than any I had ever noticed in building journals, that I bought several more copies, and through studying them and observing what was going on around me in the way of building I commenced on a plan for the house I would like to build for myself. Like most people, my wife and myself have looked forward to



Foundation.—Scale, 1-16 *Inch to the Foot.*

the time when we could have a home of our own, and the plans I forward to-day show (as well as I am able to represent it) the house. Being in the employ of a railroad, it is doubtful when we will build, as it is uncertain how long I will remain in one place, but I hope to be in some other business some time and permanently located, so that we can have our own home. I have noticed plans published in your journal, and criticisms on same, and it is with this object in view that I send you the plans and hope you will find them of sufficient interest to place them before your readers.

I would like to enumerate what I consider the good points in this plan, as follows: The general form of the building is almost square, acknowledged to be the cheapest form for the amount of inside room. The house is intended to be built in Kansas, where in summer there is almost constantly a breeze from the south, and which is essential to a comfortable house. The house is intended to front south, and by putting a window in the closet on the second floor we get the south breeze in three of the bedrooms. Having a vestibule and a grate in the front hall makes it possible to use the hall as a room. Closet in every bedroom, linen closet opening from hall upstairs and a closet under front stairs large enough to store a couple of stoves in summer if desired. Also a small cloak closet opening off front hall Two doors between the kitchen and every other room in the house, preventing smells from the kitchen pervading the other rooms. Sliding doors between hall, parlor and dining-room. Space for sideboard, which can be built into the wall if desired, and which will leave the dining-room of



Attic and Roof.—Scale, 1-16 *Inch to the Foot.*

regular shape. Pantry large enough for refrigerator, shelves with drawers and a tilting flour bin under and a swing table which folds against the wall when not in use. Pot closet is under china closet, and opens from pantry only. China closet can be used (the lower shelf of it) as a serving shelf if desired. Sink in kitchen with pump to cistern and furnished with hot and cold water from pipes leading to bathroom above. Sink to open underneath to prevent dampness. Small amount of pipe and plumbing necessary to supply bathroom, and pipes are carried up against an inside wall next the chimney, lessening the danger of freezing in winter. With the exception of chimneys extending out from some of the walls the rooms are practically square, making a saving in cutting carpets. Dimensions of bedrooms such that they will require exactly four breadths of yard-wide carpet. The dimensions shown on plans being between plaster faces of walls. This is often quite an item with housewives. Both stairways and doors to bedrooms open on to the small central hall on second floor, which is lighted from window on landing of front stairs and through transoms over doors, and requires but little space for hall room. Arrangement of windows and doors allows plenty of wall space for furniture, while all rooms are plentifully supplied with light from at least two sides. Two chimneys only are required. The stove-pipe hole from back bedroom, through which it is intended to extend pipe to flue across the hall, could if preferred be cut through ceiling of the bedroom and carried across to the flue in the attic. This would require more pipe, but would probably be preferred by many. Cellar extends under dining-room, kitchen and pantry, and has both inside and outside stairways. Stairway leads to attic, which can be used as a storeroom for trunks, &c.

Now, for a few objections: The location of the chimneys would probably be objected to by some. The attic stairs running up over front stairs and opening from a room instead of from a hall. The manner in which the roof of the bay-window and the roof of the front porch come together.

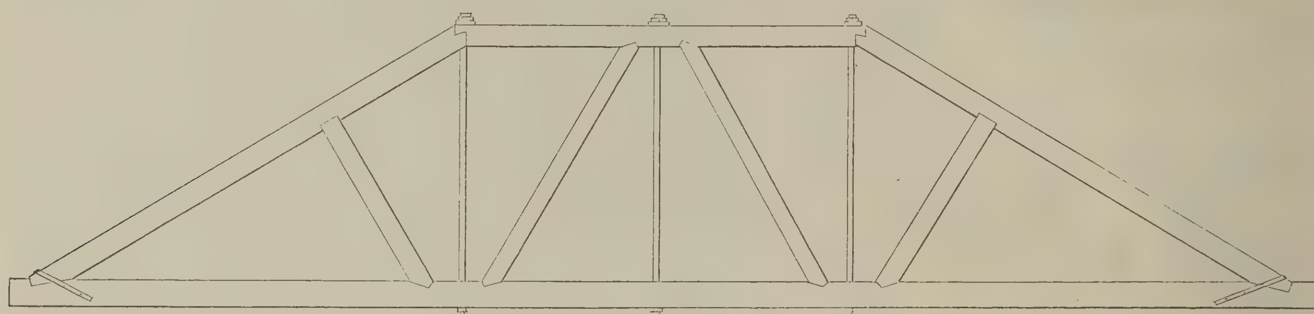
The above seem to me to be the principal objections, but considering the many advantages the house has I can very well put up with what few objections I see. I would be thankful for any criticisms you may feel inclined to make, as I am willing to learn. I have always had a "knack" of drawing, but never received any instructions, and my drawings are perhaps crude when compared with professional work, but such as they are I submit them to you without further presuming on your patience, this letter being much longer than I expected it to be. The house is intended to cost $3000 to $3500 complete, depending on the character of the inside finish.

Note.—Our correspondent anticipates some of the objections that may be urged against the design which he presents, and, therefore, we shall not occupy space with extended criticisms, but shall refer the matter to our readers for attention. In passing, we may remark that, as our correspondent says, the chimneys are, in a certain sense, unfortunately located. A very long pipe would be necessary for the kitchen stove, unless the space now occupied by the sink is devoted to the stove. Carrying a stove pipe across a hall in the second story is certainly objectionable, but this seems to be a necessity in order to get a stove into one of the bedrooms. The front bedrooms require the stove to be close to the entrance doors, or else demand the use of a long pipe. In the matter of roof, to which our correspondent alludes, our readers will see various plans by which this can be improved. The location of the attic stairs, opening from one of the front chambers, is certainly unfortunate. According to our idea, it would be better to sacrifice the closet in the servants' room or back chamber. If the attic stairs were carried up over the back stairs instead of the front stairs, the space over the front stairs could be utilized as a closet in connection with the front bedroom, thus putting that room in better shape than it is at present and extending its length nearly 3 feet. On the other hand, the servants' bedroom could be provided with a closet upon the same plan as the front bedroom with less real sacrifice to the house. It is perhaps solely a matter of taste whether a lower hall should be maintained in connection with the front stairs. By the construction shown in the drawings, the stairs are narrowed without any special compensating advantage, so far, at least, as our ideas go. It is to be noted that our correspondent specifies transoms over all main doors throughout the house. Ideas differ with reference to the utility of transoms leading to bedrooms, &c.; for our part we prefer solid doors. The location of the bathroom coming over the little plumbing that is required in the kitchen is advantageous. Just what provision our correspondent has in mind for a water supply does not appear. He probably contemplates a tank in the attic. If a

good water supply is available we should advise a water-closet in connection with the bath. Such a convenience if only used in case of sickness or at night, should not be disregarded even in cheap house planning.

Roof Truss.

From O. E. M., *Richmond, Ind.*—I Inclose the sketch of a roof truss. The span is about 50 feet, and the truss is required to support the weight of the roof and ceiling. I would like to have the opinion of practical readers of *Carpentry and Building* as to the arrangement of rods and struts. The center rod, of course, is to be the largest.

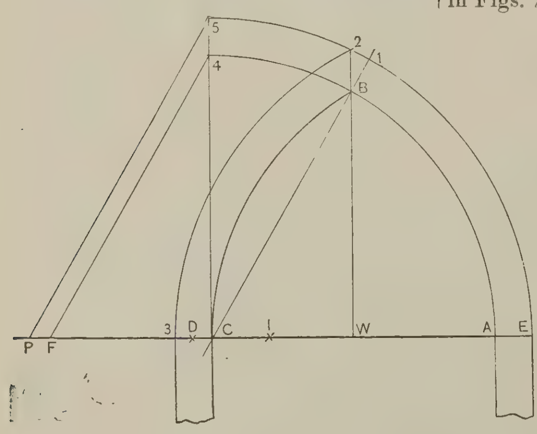


Roof Truss. Submitted by O. E. M.

Note.—We refer this question to our readers, as our correspondent desires.

Splayed Jambs.

From F. H. S., *Columbus, Ind.*—In the June number of *Carpentry and Building*



Splayed Jambs.—Fig. 1 of Diagrams Accompanying Letter from F. H. S.

is a communication from "W. A. W," of St. Paul, Minn., in which he asks information regarding the proper method of getting length of pattern for veneer and how the lines for kerfs are found. In the construction of circular and Gothic frames, in answer to his inquiry, I will say that the plan given by him is incorrect, as the inclosed plans and explanations will show when put to test. Fig. 1 is a Gothic frame, its radius is its width. With C as center, draw the quadrant A 4 and E 5, with A as

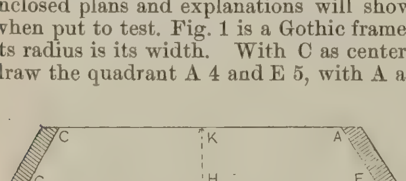


Fig. 2.—Horizontal Section.

a center, B C, which completes the head of frame. In order to get the proper construction of pattern for veneer, straight lines equal in length to the curved lines A B and E I, must be found. To do this, draw F 4 and P 5 parallel to C B, then A F and E P will be equal to A 4 and E 5. Divide the quadrant A 4 into three equal parts, the segment A B will contain two of the parts. Divide the line A F into three equal parts, then you will have A D as length of A B, and E D of E I.

Fig. 2 is a section through A C, Fig. 1, showing width and splay of jambs. To draw the pattern for veneer, draw line G 6, Fig. 3, any length. Make H K, Fig. 3, equal H K, Fig. 2. Draw the lines A D and E D at right angles to G 6. Make A D and E D equal A D and E D, Fig. 1. Through the points A E and D D draw lines, cutting perpendicular at G, with G as a center. Draw the curved lines D A, D E. Make I 2, Fig. 3, equal I 2, Fig. 1, which completes pattern; with G as a center, draw lines for kerfs as shown. To construct veneer for circle frame proceed same as for Gothic, except you use the whole quadrants A 4 and E 5, then A F would equal A 4, and E P equal E 5. Proceed same as in Figs. 2 and 3. Observe that in drawing Fig. 3 for circle frame, perpendicular line must cut A F and E P through their centers.

Care of Buildings.

From C. T., *Chicago.*—Some time since there came near being a disastrous fire in a large building located in the business center, on account of the straw and paper that had accumulated at the bottom of the elevator shaft being accidentally set on fire by means of a cigar stump that some careless person threw down. It was only by the timely arrival of the Fire Department that a serious conflagration was averted. The cause that led to the burning of the music store of Julius Bauer, on Wabash avenue, may never be known to a certainty. There was an explosion in the basement, and then the fire spread so rapidly that it was with difficulty that the people in the building could get out. Some said that there had been a smell of gas in the basement, and most every one knows that when illuminating gas is mixed with air in the proper quantities, that an explosive compound is the result. Another cause given was that some varnish that was in the basement might in some way have exploded. It might interest the public to know just how the explosion occurred, but it would perhaps do little good. The proper thing for the public is for each one to use all the care he can that these mysterious accidents do not occur. There are few large or small buildings where there is not to be found some place where rubbish of some kind is allowed to accumulate, or where the gas-fixture is too near the woodwork. During cold weather water often accumulates in the gas meter, and it is sometimes necessary to remove the meter so as to empty out the water. Without great care is taken the couplings that connect the gas pipes may not be screwed up tight, or a washer may drop out, so a tight joint would be improbable. When a fire occurs it interests the public to know how it originated; on the other hand, by using proper care many "mysterious" fires will be prevented.

Felting Under Tin Roof.

From W. C. S., *Clinton, Ont.*—I would like to know what is the best kind of felting to use under a tin roof. Is there any particular kind that is used for the purpose? The only kind we have here is tar felt and tar paper, or what is called straw or alum paper that is used for sheathing. I am intending to put on a flat tin roof. If I put on tar paper or tar felting between the boards and tin will it do the tin any harm? Does the tar injure the tin? We have here a very trying climate, so much so that a galvanized iron roof I have has been torn to pieces by the heat and cold, so I am intending to try tin.

Answer.—The kind of roofing felt that contains coal tar could hardly be recommended for the purpose—in fact, it is a positive injury to the tin. There is a kind of building paper that is saturated with rosin, known as rosin sized sheeting, that is better for such use as our correspondent names.

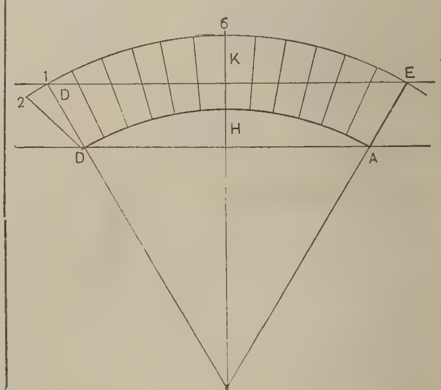


Fig. 3.—Pattern for the Veneer.

The Square of the Diameter.

From A. B., *Brooklyn, N. Y.*—A juvenile in mensuration would like to be informed by some of the readers how to square the diameter.

Answer.—Our correspondent was particular to specify that the reply should come from the readers, but we trust he will not be offended if we venture to answer his question, though, of course, if any of our readers would like to give further information we would be glad to print it. The square of the diameter is

a term frequently used in rules for determining the areas of circles. The process is a very simple one, as it is only necessary to multiply the diameter by itself, the product being the square. For instance, if the diameter of a circle is 4 inches, the square of the diameter would be 4 times 4, or 16. Multiplying 16 by 0.7854 the product would be the area of the circle. If our correspondent has any further questions to propound concerning simple mensuration we would be glad to answer him to the extent of our knowledge.

Problem in Hand-Railing.

From J. H., *London, England.*—Referring to my communication on the subject of hand-railing published in the August number, page 173, I beg to say that a slight error was made in the statement.

Form of Hand-Railing Accompanying Communication from J. H.

There are 5-inch planks on hand for the job. I inclose a sketch showing the one-half section of the hand-rail. This will make it clearer to your readers than it is at present. I hope to see a solution in an early number.

A Water Telescope.

From S. H., *St. Louis, Mo.*—There may be some of the readers of *Carpentry and Building* who live near lakes or rivers, who will be interested in the following account of a water telescope. Regarding the supposed difficulty of procuring a piece of round glass, I would say that all one has to do is to place the glass under water and then cut it with a pair of snips. The tinner who does not know how to cut glass with a pair of snips is behind the age. The article referred to is as follows:

The water telescope may be made of wood or of tin, whichever you prefer, and we will describe both. The tin is better because it is lighter and more easily handled. Its manufacture is very simple. Get a tinsmith to make for you a funnel-shaped tin horn about 3 feet long. It should be 8 or 10 inches in diameter at the bottom and broad enough at the top for both eyes to look into. Into the bottom put a piece of glass cut to fit, and make it perfectly water-tight. Leave the top open. The inside should be painted black to prevent the reflection of the light upon the surface of the tin. Around the outside of the bottom solder on several sinkers to offset the buoyancy of the air in the water-tight horn and make it easier to submerge. If it is not convenient to get a round piece of glass, have the large end made square and use square glass. That is all there is of it, and when you sink the instrument down into the water and put your eyes to the small end you will be perfectly astonished at the plainness with which you see all kinds of fish and water animals swimming around in a state of nature.

A wooden water telescope is made of a long, square, wooden box, say 10 inches square at the large end and 4 or 5 inches square at the other. Make all the seams water-tight by means of putty and paint. Put a piece of glass in the large end and leave the small end open to look into, as you do with the tin instrument. A great many of you go on boating and picnic parties, and you can imagine how much such a contrivance would add to your amusement and pleasure, to say nothing of the instruction derived from studying the inhabitants of the water at home. Using the principle of the water telescope, a well-known naturalist had a boat made with a glass in the bottom, through which he could see every movement of the thousands of fish as they swam along through the clear water. Fishermen in Norway use the water telescope at their work, with the best results, sometimes discovering a new kind of fish that might otherwise have escaped the notice of man.

Bricking a Cistern.

From W. J., *Pattonville, Mo.*—What material should the brick in the walls of a cistern be laid in? Is it best to lay them dry and then cover the inside with cement? I know of several cistern builders who follow the above plan, and others who contend it is best to lay the brick in a composition of lime, sand and cement. My idea is, that the brick should be laid in cement, using two parts of sand to one of cement. I think a discussion of this subject by the practical readers would be of great interest and benefit to many readers.

Note.—The above inquiry was referred to a mason of great experience in building various kinds of similar work, and his advice was to lay the brick in the same composition that our correspondent recommends, only that the brick should be laid with open (inside) joints, so that the final inside coat should have a good hold. This final coat should be put on at least ¾ inch thick, and in one coat only. The cement lining, when done, should be kept sprinkled enough to keep it moist, and permitted to stand at least one week before allowing water to be admitted. Another idea advanced was, that the bottom of the cistern should be made of concrete, care being taken to have it strong enough to withstand the great pressure that it would naturally have to sustain. Just how thick this bottom would have to be would depend, to a great extent, upon the kind of soil the bottom was to rest upon. Our informant further remarked that lime should never be mixed with cement.

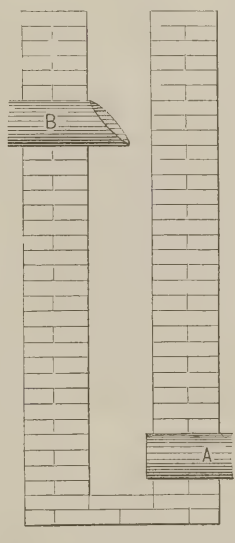
Trouble With a Roof.

From F. W. L., *Cleveland, Ohio.*—One year ago last October I laid a roof, covering it with one of the best-known old-style tin plates in the market. The roof in question was over a foundry in this city. The room in the building is used for the storage of cores and has a ventilator extending the full length of the building. The roof was well painted soon after laying. A few days ago, on examining the roof, I found that, at a distance of about 3 feet from the ventilator extending along the ridge, the sheets were completely riddled with pinholes. I am at a loss to know the cause, for every other part of the roof seems to be in perfect condition and there is no sign of rust, even where the rosin has forced the paint off. My idea is that there is a fine cinder from the smoke-stack that settles in the place indicated; but this, it seems to me, ought not do the mischief. Any information that I may be able to obtain through your columns will be appreciated.

Note.—Our correspondent has met a piece of experience not unlike that of many other roofers. The roof over a foundry is one of the most difficult problems that the metal roofer has to solve. It makes very little difference whether tin plate, black or galvanized iron is used, under certain conditions the roof is rapidly destroyed. Sometimes it is the steam from the sand piles in the foundry; other times it seems to be the gases in the air from the cupola, and still other times it seems to be something derived from the cinders. Roofs of buildings adjacent to foundries are often served in the way here described, from which it is fair to argue that the gases from the cupola and the cinders are primarily responsible for the difficulty. In thus pointing out what is probably the trouble with the roofing in question we do not give our correspondent much assistance; we leave him practically where he described himself in the letter before us. If any of our readers have anything to say on this subject we shall be glad to hear from them. In conclusion, we may remark that we are always slow to recommend metal as a covering for a foundry roof.

How to Make a Chimney Draw.

From B. S., *New Orleans, La.*—"Once upon a time" I had to see to a stove that was located in the second story of a building. Sometimes it would draw and others it would not. After some study



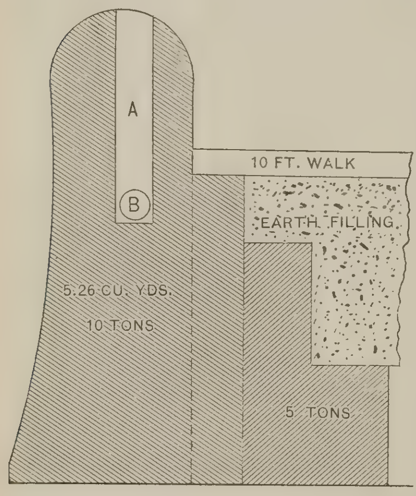
How to Make a Chimney Draw.

I found out that when the fire was started in the lower stove first, the upper one would not draw, but when the upper stove had the first chance at the chimney, it operated quite well. To illustrate the condition of affairs, a sketch is inclosed. A represents the lower pipe in chimney, and when the fire was lighted below first, the current of air would pass the opening B so rapidly as to cut off the draft. To remedy this, a piece of stove-pipe was trimmed like the half on an elbow, and put into the chimney as shown at B. This would prevent the current of air or smoke from spoiling the draft, and did not close up the opening enough to interfere with the draft of A. The shape of the pipe B can be determined by the size of flue; if it is very narrow or small, the pipe B can be trimmed to suit the circumstances. About the easiest way of studying the action of smoke in chimneys is by watching the water where one river runs into an-

other. If the branch runs into the main river nearly at right angles, the branch will have a poor "draft," but when it enters at an angle, the water from the branch will be drawn in. If the shape of the river bank is such as to produce the same result as B, then the water will join the main river very rapidly; it produces the same effect as a Y.

Construction of a Sea Wall.

From R. A. S., *Chicago, Ill.*—I presume that the readers of *Carpentry and Building* will be interested in some of the particulars concerning the construction of the sea wall along the Lake Shore Drive, Lincoln Park, this city: About 14 years ago, a shore protection to the Lake Shore Drive was built, consisting of an outer row of piles, driven as close as could be, 8 feet, back of which was another row (see Figs. 3 and 4), and the space between filled with stone and cedar bark. As this protection was found to be inadequate, it was decided to replace it by a concrete wall, which for the present is to extend from Bellevue Place for about ¾ mile north. As no similar works exist along the lake shore, apprehensions were entertained that the concrete would not stand the climate. These fears seem groundless, for the first of this work, built two years ago, is as solid as when first laid. Concrete is a cheap material for such work, for sand and gravel are abundant where such work is required. That used for the sea wall referred to contains 1 part best Portland cement, 2 parts sharp, coarse sand, and 4



Construction of Sea Wall.—Fig. 1.—Vertical Section.

parts broken limestone. This is well mixed, moistened, and then thoroughly pounded into wooden molds, and allowed to stand about 24 hours before the mold is removed. The blocks that have lately been laid in the wall were made last October, but some have just been set that were made only 30 days ago. The blocks are 10 feet high, 4 feet wide and 5 feet from front to back. They weigh some 10 tons each. With the back filling of concrete the weight is 15 tons. Credit is due the engineer in charge, Mr. E. C. Wiley, for the energy with which the work is being pushed. Notwithstanding the recent storms, 155 blocks, measuring 620 lineal feet, were set during the month of July. The method of doing the work is quite unique. First the bark and stones of the old protection have to be removed by hand from between the piles; then boards are nailed in place to serve as a guide for sawing off the tops of the piles, which is done with a large cross-cut saw. This is necessary in order to lay down a tramway for the steam saw, which is used to saw off the piles below the surface of the water; 6 x 12 oak timbers are then spiked along the piles, upon which are placed a double layer of 3 x 12 oak plank to serve as a foundation for the concrete blocks, which are placed in position by means of a steam derrick. To allow of the blocks being lifted, groves A, Fig. 1, are left in the sides of each block and a hole, B, so a chain can be passed through. After the blocks are placed in position the joints are calked

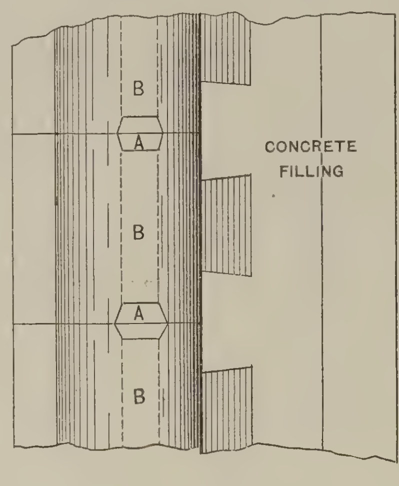


Fig. 2.—Plan.

with old rope or oakum and the spaces between them, including the grooves A and the holes B, are filled with cement. After this is done rough boards are so placed as to facilitate filling in the concrete back, which weighs some 5 tons to each block, making the whole block 15 tons. After this has been done the earth filling is put in up to where the 10-foot walk is to come. At the edge of the walk is a drain covered with slats to catch the water, which, in a storm, dashes over the wall. This water is conveyed back into the lake through suitable openings in the sea wall.

Pigeons on a Cornice.

From McL. and McF., *Victoria, B. C.* —After a cornice is completed on a building the cornice worker is supposed to take an interest in its welfare for an indefinite period, and some peculiar questi ns are asked. The latest in our experience is that asked us by the owners of a building in town who are very much annoyed by having pigeons resting upon the numerous projections and other "architectural features" of the cornice work, and causing great annoyance to persons below, as well as defacing the building.

Note.—Undoubtedly it is easy to ask questions and hard to answer them. Many years ago there was a fine building put up in the city of Milwaukee, Wis. The architect made the drawings for what wa then called a "hanging" cornice. This cornice was beautiful to behold—to the birds—and they crowded to occupy it. The result was that a wire netting was placed over the cornice to keep the birds off. The question that our correspondent asks is one that is hard to answer. It is too late to prescribe a new school of architecture that will so construct the moldings and brackets of a cornice that a bird could not light on it. It would appear from our correspondents' letter that the pigeons find a lodging place on top of the cornice as readily as one of their race did upon Noah's ark some years ago. There are various remedies for this difficulty. One was prescribed by General Dix when he said "Shoot them on the spot." Another would be, place electric wires on the face of the cornice, so that when the pigeons touched their feet to the wires the electric current would deprive them of life. There are many other ways of solving this problem, but perhaps the easiest way of all is to smash the eggs before the pigeons are hatched—that is, have no pigeons.

Patent Applied For.

From E. G. Q., *Hustisford, Wis.*—I would like to learn through *Carpentry and Building* if a man is authorized to mark an article "Patent Applied For" when he has simply filed a caveat in the Patent Office. Further, can he safely put the article on the market under these conditions? By answering these questions you will confer a great favor.

Answer.—In branding an article "Patent Applied For," the manufacturer deliberately states that a patent on the invention is pending in the Patent Office.

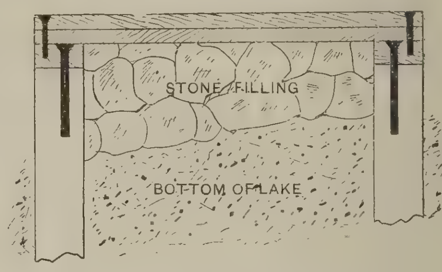


Fig. 3.—Section through Foundation.

We do not think that any construction of the Patent Law would warrant a caveat being considered an application for a patent. A caveat, as commonly regarded, is preliminary protection, and is valid only for a certain period and runs out unless it is renewed, and in no event does it take the place of an application for a patent. If a caveat is filed there still remains the necessity of applying for a patent at the proper time. In our own practice we are disposed to advise applying for a patent at once instead of filing a caveat. A patent application on the invention could be so managed and the case could be so conducted as to secure to the inventor all the time that he needs for the development of his patent, and with the patent applied for he is justified in warning the public against infringement of his rights, as our correspondent evidently desires to do. Whether or not an inventor is justified in putting an article on the market with a patent applied for and not granted depends very much upon circumstances. It

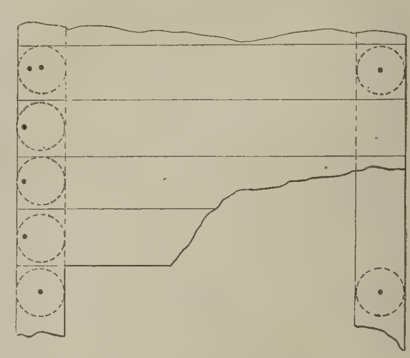


Fig. 4.—Plan of Foundation.

is very often done, and in comparatively few cases are difficulties encountered. The law allows the inventor two years in which to apply for a patent from the time that his invention is completed. It puts upon him, however, the burden of proof to show priority of invention in case some one else has taken out a patent on that identical idea in the interval. Without knowing more of the facts of the case than are presented in our correspondent's letter, we cannot answer him more satisfactorily.

Pocket for Window Frames.

From T. W. B., *Brooklyn, N. Y.*—I notice in the September number of *Carpentry and Building* that "O. B. M." asks for a rule regulating the pockets for window frames. Some years ago I heard of a rule that I have since used and found to work satisfactorily. It has also proven advantageous to other men in the trade to whom I have explained it. It is as follows: Allow 3 inches to each foot of length of pulley stile and 4 inches where plate glass is to be used. Allow in proportion for each fraction of a foot.

Tin Over Old Shingles.

From O. K.—Would you let me know if a standing-seam tin roof could be laid over an old shingle roof, so as to make a good job, without removing the old shingles?

Answer.—It is generally considered by roofers that one of the requirements for a good tin roof is to have a firm and level foundation to lay it on. On this account planed and matched flooring is recommended as a foundation for the tin to be fastened to We would advise our correspondent to remove the old shingles, and have the roof boards as level as possible. This said, however, we know of roofs that have been laid over old shingles, but the labor of putting them in place more than offset the saving.

Smoky Chimneys.

From C. T., *Chicago.*—There may be some of the readers of *Carpentry and Building* that have been so fortunate as never to have been called upon to wrestle with a smoky chimney. Those who have used up their knowledge in a vain endeavor to make a mulish chimney draw will, perhaps, be interested in reading the two following letters by Dr. Franklin. Cases of smoky chimneys may arise which may puzzle the science of the most accomplished smoke doctor. Accordingly we borrow the following from the author named. "I once lodged," he says, "in a house in London, which, in a little room, had a single chimney and funnel. The opening was very small, yet it did not keep in the smoke, and all attempts to have a fire in this room were fruitless. I could not imagine the reason, till at length, observing that the chamber over it, which had no fireplace in it, was always filled with smoke when a fire was kindled below, and that the smoke came through the cracks and crevices of the wainscot, I had the wainscot taken down and discovered that the funnel which went up behind it had a crack many feet in length, and wide enough to admit my arm; a breach very dangerous with regard to fire, and occasioned, probably, by an irregular settling of one side of the house. The air entering this breach freely, destroyed the drawing force of the funnel. The remedy would have been filling up the breach, or rather rebuilding the funnel; but the landlord rather chose to stop up the chimney."

The second case occurred at the house of a friend near London. "His best room had a chimney," says Franklin, "in which he told me he never could have a fire, for all the smoke came out into the room. I flattered myself I could easily find the cause, and prescribe the cure. I opened the door, and perceived it was not want of air. I made a temporary contraction of the opening of the chimney, and found it was not its being too large that caused the smoke to issue. I went and looked up at the top of the chimney; its funnel was joined in the same stack with others, some of them shorter that drew very well, and I saw nothing to prevent its doing the same. In fine, after every other examination I could think of, I was obliged to own the insufficiency of my skill. But my friend, who made no pretension to such kind of knowledge, afterward discovered the cause himself. He got to the top of the funnel by a ladder, and, looking down, found it filled with twigs and straw cemented by earth, and lined with feathers. It seems the house, after being built, had stood empty some years before he occupied it, and he concluded that some large birds had taken advantage of its retired situation to make their nests there. The rubbish, considerable in quantity, being removed, and the funnel cleaned, the chimney drew well, and gave satisfaction "

Location of Cesspool.

From C. H. S., *New York.*—Will you kindly inform me if in building a country house on a lot 25 x 100 if it is desirable to have a cesspool with an open bottom in order that the liquid might be absorbed by the ground? If this is difficult, state what would be the better plan. I am aware of the merits of the earth closet, but the tenants insist on having modern plumbing, with water carriage system. It is proposed to have the well located beneath the cellar floor, about 60 feet from the proposed cesspool. Would it be better to have it outside the house?

Answer.—Our correspondent presents a problem to which it is very difficult to give a positive and satisfactory answer. The conditions are fixed, and there is no chance to do as one would like or as the merits of the case might demand. A 25 x 100 lot is a small space of ground in which to locate both a well and a cesspool. Depending somewhat upon the character of the soil, the well is very likely to be affected by the cesspool, if it is constructed upon the open bottom plan. Cemented cesspools are frequently resorted to under conditions similar to those named by our correspondent, the idea being to pump them out from time to time and carry the waste away. However it is managed, the system is a nuisance, and very often is a menace to health. From our own experience we are disposed to limit the use of modern plumbing with the water carriage system to houses where there are sewers. The only exception would be in a country place, where the cesspool could be taken a considerable distance away from the house and have planted about it trees of a kind calculated to take up the waste matter. As to the location of the well, it is certainly inexpedient to have it under the cellar floor. The well should be located where it is convenient to get at it for cleaning purposes and where, above all things, it can be protected against vermin or the accidental contamination of the water from things dropped into it. Change of air is also desirable. Under the cellar floor is certainly a poor place for it. Altogether our correspondent has a difficult problem, and, under the conditions which govern, it will be hard for him to make any arrangement that could not be bettered, if he had the opportunity to work in a larger space.

Questions in Steam Heating.

From R. & H., *Boulder, Col.*—We would be very much obliged to have answers to the following questions in steam heating: What is the best way to find the radiating surface required in a house when the cubic contents is known? What is the rule for determining the size of a supply-pipe, the return-pipe and the risers? What is the best way to estimate on the labor required in fitting a house with steam-pipes? We would like very much to see a diagram illustrating the method of measuring a building for steam heating. Please give a list of the best books on steam heating, such as would be of use to a practical man.

Answer.—Rules for estimating the radiating surface required per cubic foot of space are not very reliable, for our correspondents will readily see that a building with very large exposure in glass, for instance, will require much more heating surface for the same space than a building with thick walls and little window area. The location of the building is another important item and the latitude of the place must also be taken into account. Bearing in mind these modifying conditions, the best we can do for our correspondents is to give the general rules, which, for dwelling-houses, allow 1 square foot of radiating surface to every 50 or 60 cubic feet of space. We are not familiar with the climate of Boulder, but imagine that it is much colder than that of New York, and would therefore advise them to use the rule of 1 foot of radiating surface to 50 feet of space rather than the other. In Baldwin's book on "Steam Heating for Buildings," he advises the use of a pipe of 1 inch diameter to every 100 square feet of radiating surface. The area of a 1-inch pipe is 0.7854 square inch. By squaring the diameter of a pipe in inches the result would be the number of 1-inch pipes that the main pipe will supply steam for, every 1-inch pipe, furthermore, being adequate for 100 square feet of radiating surface. We may say here that the practice in all matters relating to steam and hot-water heating varies with different engineers, and it is impossible in this limited space to give any full reply. If our correspondents contemplate going into the steam-heating business to any extent, we advise them to study up the whole subject and then to deduce their own rules of practice. In proportioning the main supply-pipe to the risers the above rule will serve, and as to the size of the return-pipes they can be made the same diameter as the risers, or a fraction of an inch smaller. We have no table at hand, and could give no general rule applicable to different sizes. Our correspondent's question with reference to the names of books on the subject of steam heating is a difficult one to reply to, as the literature of steam and hot-water heating is exceedingly meager, and a good part of it relates to English practice, and is therefore of little, if any, service in this country.

Decorative Treatment of Walls.

The modes of treatment of walls, whether on dado, frieze or wall space, are multiplying. This is a good sign, as leading, at all events, to various departures from the ordinary course. Some of these allow play for manipulative skill in molding as well as for the brush of the painter. Many compositions of a plastic character are brought forward designed to supersede wall paper, or to supplement it. Such differ mainly in their composition, whether intended to present irregular surfaces, to have figures fashioned by a tool in the hands of the workman, or directly molded from a die. Almost any material, ground up and pressed and brought into a pasty consistence, with its particles held together by some glutinous substance, will serve to operate upon. The composition must present on drying a hard surface. Other materials, like Lincrusta, are beforehand pressed in sheets and molded, requiring only to be shaped and attached with glue to the surface of the wall. When it is placed on the wall in a plastic state for designs to be worked out upon it with a tool or tools, it is of the first importance that the material should not harden too quickly, in order that full time may be afforded to carry out the design to a finish.

The Texas Capitol.

Ever since the State Capitol building of Texas, which, as our readers have already been informed, was undertaken under some peculiar conditions of contract, has been nearing completion, controversies have been in progress concerning the quality of the work and the fitness of the building for the purpose intended. Not long since a report was very generally circulated throughout the country that radical defects in the construction of the building had been discovered, and from some dispatches which were published it seemed that the building was in imminent danger of tumbling down. This, we believe, was satisfactorily cleared up to the credit of all concerned. According to a dispatch from Texas, dated September 7, the State Capitol Board, consisting of the Governor, Secretary of State, Treasurer, Land Commissioner and Comptroller, unanimously adopted a resolution refusing to receive the building, on the ground that it has not been built in accordance with the terms of the contract. It is claimed that the copper roof leaks, and that there are other similar defects. The outlook, so far as indicated by dispatches, is that litigation will follow, which will, no doubt, be expensive to all concerned. The architect of the building is E. E. Myers, of Detroit. A reporter a few days since visited Mr. Myers, who said in reply to questions that he was employed by the State simply to furnish the plans and specifications and that he had nothing to do with the superintendence or erection of the building. So far as can be gained from the brief dispatches that have been published, he is disposed to lay the blame upon one of the Chicago contractors. He asserted that according to the specifications the dome of the building was to be entirely of cast iron. By alteration of the plans, by permission or otherwise, galvanized iron was substituted in place of cast iron. This, the architect claimed, cheapened the work, while at the same time it injured the stability of that part of the building.

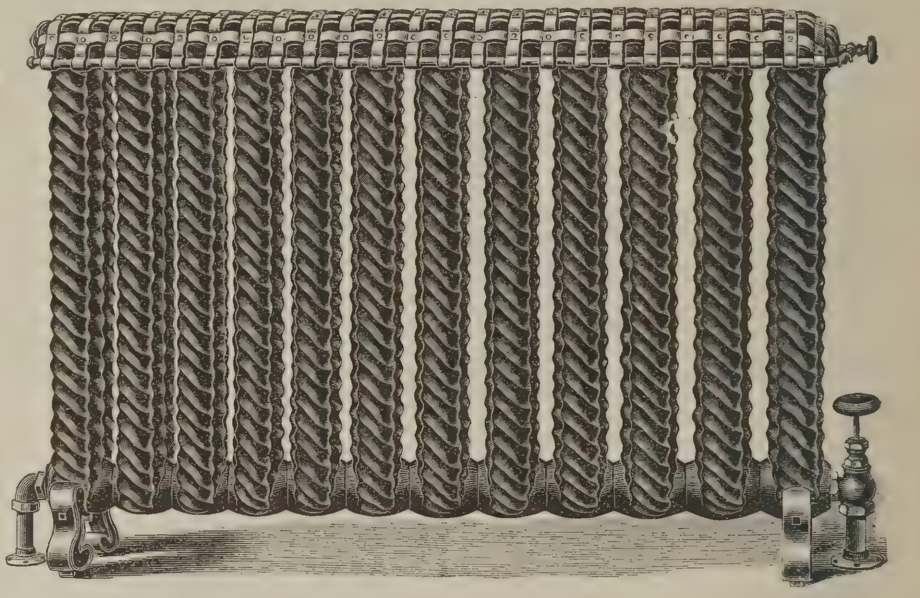
Wood Water-Pipes.

All of the earlier water-works in America used mains of wood constructed out of what is known as pump logs, or timber bored from end to end by means of a pump auger, and pointed at one end so as to fit into the countersink at the end of the next log, the space between the two being caulked with oakum. It is known that these pump logs have certainly lasted nearly a century in some locations, although they are of course not to be compared with cast-iron pipes used for such purposes. In some portions of the western part of the United States they are using large water mains built of staves, made up similarly to a wooden trunk sometimes used to furnish a supply of water to turbines, and it is found that they answer their purpose very well for light pressures. The difficulty with the use of this type of pipe or turbine was that when the pipe became old and weakened by decay it was liable to accidents, especially those caused, whenever the gates were closed quickly, by the impact of the energy of the water flowing through the wheel. The present water supply of Tokio, Japan, is by the wooden water-pipe system, which has been in existence over 200 years, furnishing at present a daily supply of from 25,000,000 to 30,000,000 gallons. There are several types of water-pipes in use, the principal class being built up with plank, square, and secured together by frames surrounding them at close intervals. The pipes, less than 6 inches, consist of bored logs, and somewhat larger ones are made by placing a cap on the top of a log in which a very large groove has been cut. All the connections are made by chamfered joints, and cracks are caulked with an inner fibrous bark. Square boxes are used in various places to regulate the uniformity of the flow of the water, which is rather rapid, for the purpose of preventing aquatic growth. The water is not delivered to the houses, but into reservoirs on the sides of the streets, nearly 15,000 in number.

NOVELTIES.

Some New Radiators.

The recently issued catalogue of the Hopson & Chapin Mfg. Company, New London, Conn., refers to some new radiators, illustrations of which we present herewith. Figs. 1 and 3 show front and end views of the New London radiator, for which application for patents has been made. The radiator is for direct heating with hot water, and the manufacturers particularly mention that the interior is cored out, so that the metal is of equal thickness in all parts. By this means the radiating efficiency is greatly increased, as there is no extra thickness of metal to prevent the heat from passing out. The screens on the top of the radiators, of simple plaited pattern, are very tasteful and in keeping with the general appearance of the radiator. The New London radiator is made in three patterns, A, B and C, 36, 28¼ and 18¼ inches in hight. The width in all cases is 10 inches and the number of sections varies from 3 to 32, making the length from 10½ to 112 inches. In pattern A the heating surface, according to the number of sections, varies from 21 to 224 square feet; pattern B, from 15 to 160 square feet, and pattern C, from 9 to 96 square feet. Fig. 2 shows the general appearance of the Base Board radiator, which is designed with a view to getting the heating surface low down on interior walls, bay windows, &c. The Base Board radiator is 12 inches high and extends 5 inches from the base board. Each section is 3½ inches long and contains ¾ square foot heating surface. This radiator, we are informed, is only built on specification and will be made to turn any angle for bay-windows, &c. A brass radiator,



Novelties.—Some New Hot-Water Radiators.—Fig. 1.—Front View New London Radiator.

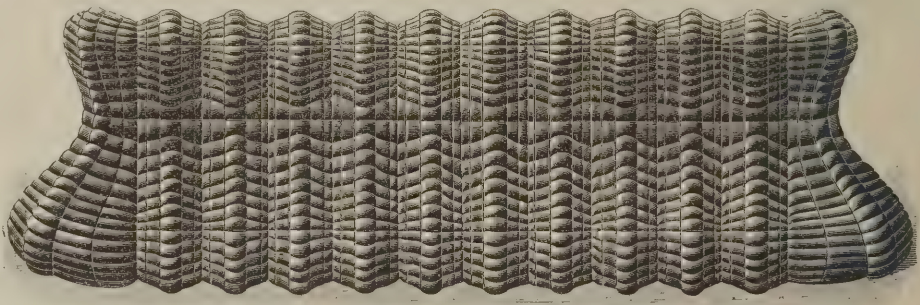
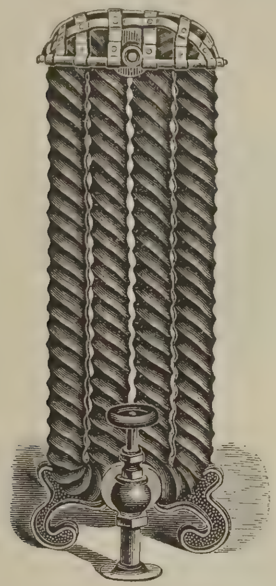


Fig. 2.—Base Board Radiator.

Gummey, Spering & Co., Philadelphia, Pa., have issued an interesting little pamphlet of some 16 pages devoted to an illustrated description of the Patten metallic roofing shingles and tiles which are a leading specialty of the firm. The first page presents a view of the house, on the roof of which the Patten shingle is used, built by the master carpenters of Philadelphia for the Building Trades processsion during the the Constitutional Centennial celebration in that city in September last. The second page shows the company's special exhibit at the International Novelities Exhibition in 1885, when their patent shingle was awarded first premium silver medal. Following a very comprehensive description of the shingles are full directions for putting them in place. Numerous testimonials are presented from people in various sections of the country showing the estimation in which these shingles are held by them. The use of metallic shingles is on the increase, and a strong point in their favor consists in the fact that they do not become saturated with moisture and rapidly decay nor allow insects to eat through and render leaks frequent and annoying. The company report a good trade in their leading specialties, among their recent shipments being a large order to Vermont.

recently patented by the Hopson & Chapin Mfg. Company, is illustrated in Fig. 4. The pattern shown in the cut is of plain tubes, but it also can be made of any



Novelties.—Fig. 3.—End View New London Radiator.

variety of drawn brass tubes, specimens of which are shown at the side. The manufacturers state that, if preferable, it can be made nickel-plated. This radiator also is only made to order and will be turned out in any design, according to the wishes of the purchaser.

Universal Wood-Worker.

The illustration, Fig. 5, represents a new Universal wood-worker that has, besides the planing head, a four-sided vertical jointing head, which has been brought out by the Egan Company, 221 to 241 Front street, Cincinnati, Ohio. By the peculiar construction above referred to two sides of stock can be dressed at one time, or in squaring up or planing out of wind, the edge can be jointed. The column is a cored casting having a broad base, securing good floor support. The portions which receive the working parts are planed true, so that when they are bolted in position there is no vibration whatever. The main mandrel, the manufacturers assert, is made of the very best cast steel and runs in three long self-oiling boxes. The pulley or mandrel runs between two bearings, so that the mandrel will not get out of true. This mandrel is also fitted with adjustable bearings by which the boxes and mandrels, with head attached, can be moved back and forth across the machine to suit the work desired. This, it is claimed, is much better than moving the mandrel through a stationary box. The upright mandrel already referred to is of steel, and runs in journal boxes connected to the column. It carries a four-sided slotted steel head, and is driven from the same countershaft that drives the main mandrel. The jointing head can be easily removed when it is desired to use the full width of the table for gaining, sawing, &c. The tables are of extra length and width, and are made true for jointing glued-up stock. The table can be raised or lowered either on a circle of the head or straight up and down. All the adjustments are made from the working side of the machine. The machine is fitted with new beveling fences, one being placed over the main head and before the jointing head, and both being made in two parts and so arranged as to bevel. They are also constructed so as to be moved across the full width of the table. By an ingenious arrangement, where the fences are beveled, the lower part of the fences is always close to the table, having no forward movement. The reverse side of the machine is fitted with a boring attachment having necessary attachments for boring, routing, rosette making, &c.

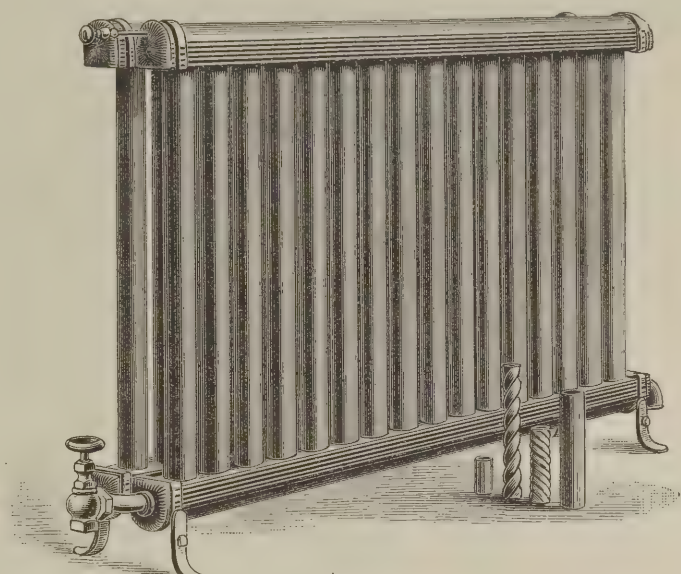


Fig. 4.—Brass Radiator.

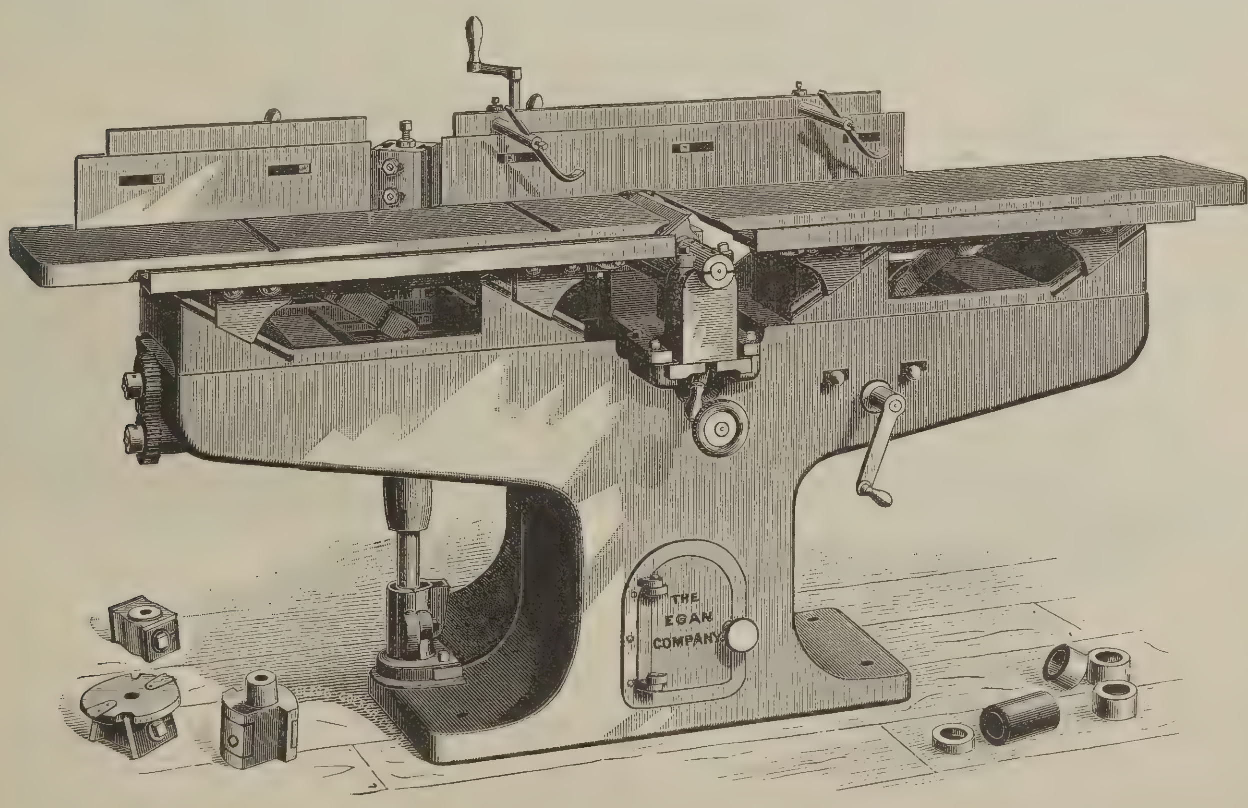
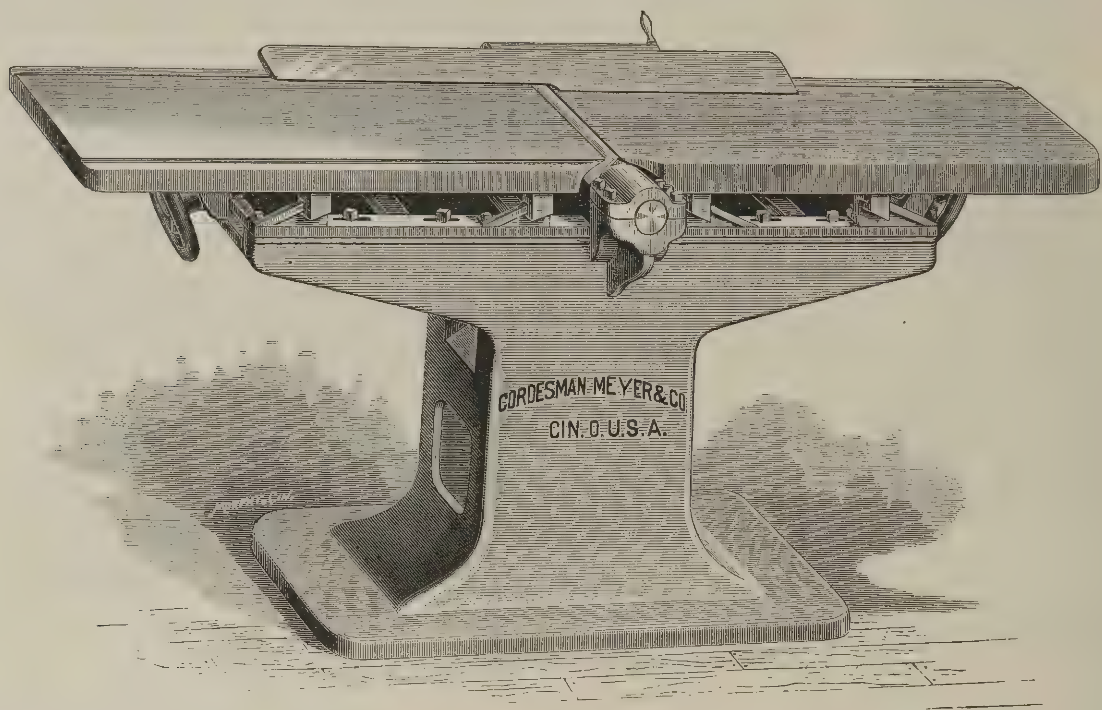


Fig. 5.—Universal Wood-Worker.—Brought out by the Egan Company, Cincinnati, Ohio.

Improved Hand Planer and Jointer.

Fig. 6 of the engravings represents an improved hand planer and jointer, which Cordesman, Meyer & Co., Nos. 186 and 188 West Second street, Cincinnati, Ohio, are just introducing. The machine is manufactured in five different sizes, 8, 12, 16, 20 and 24 inches wide. It is specially designed for making perfect glue joints, planing straight and out of line, chamfering, beveling, rabbeting, &c. As may be seen by the engraving, the frame is all cast in one piece, and is heavy and substantial. The makers inform us that the head is made of forged steel, is perfectly balanced and runs in long, self-oiling bearings lined with the best of Babbitt metal. The head as commonly manufactured carries two knives, or it is made to order four-sided, being slotted on two sides, so that molding, beading or other styles of knives with irregular edges can be used without disturbing the straight knives. The tables are heavy, and measure from end to end more than 6 feet in length, and both of them are raised and lowered on inclines by hand-wheels located at the ends of the machine, as shown in the engraving. The tables are also adapted to be moved straight back from the head, so that the knives can be conveniently changed, adjusted or sharpened. The tables on all the machines are adjusted for rabbeting. The opening over the head between the tables is quite small. An adjustable fence is furnished with this machine which can be instantly changed to any bevel and can be moved back and forth on the table, so that the full length of the knives or any part of the same can be used.



Novelties.—Fig. 6.—Improved Hand Planer and Jointer.—Brought Out by Cordesman, Meyer & Co., Cincinnati, Ohio.

Double-Deck Flooring Machine.

The Glen Cove Machine Company, Limited, Nos. 24 to 30 Clay street, Brooklyn, N. Y., have recently brought out a rapid flooring machine, which is of original and novel design. The company inform us that it has been carefully designed to meet the growing requirements of the lumber industry. The object in view is to do a large amount of work in the best possible manner. As will be seen in Fig. 7 of the engravings, the machine is a double one, and is designated by the manufacturers as a double-decker. There are two feed-ways—one directly over the other; two sets of feed rolls; two upper and two lower cylinders and two side spindles, each of them carrying two matcher heads—one above the other. Referring to the feed rolls, there is one set of six rolls for each feed-way. Referring to the cylinders, it is stated that the two lower cylinders may be omitted if only single surfacing and matching is required. Care has been taken in designing this machine to have everything compact, simple, strong and durable. The cylinders are short and stiff, with long bearings that run cool and steady. Each deck can be run independently of the other—that is to say, either the upper or lower ways may be used while the other is standing still, or both may be run together, giving with a moderate speed on each a large aggregate output of perfectly dressed and matched lumber. Each division of the machine is complete in itself and capable of running at as high speed as any single machine and at the same time do as good, if not better, work. The main object in view, however, has been to secure a moderate feed, which prevents

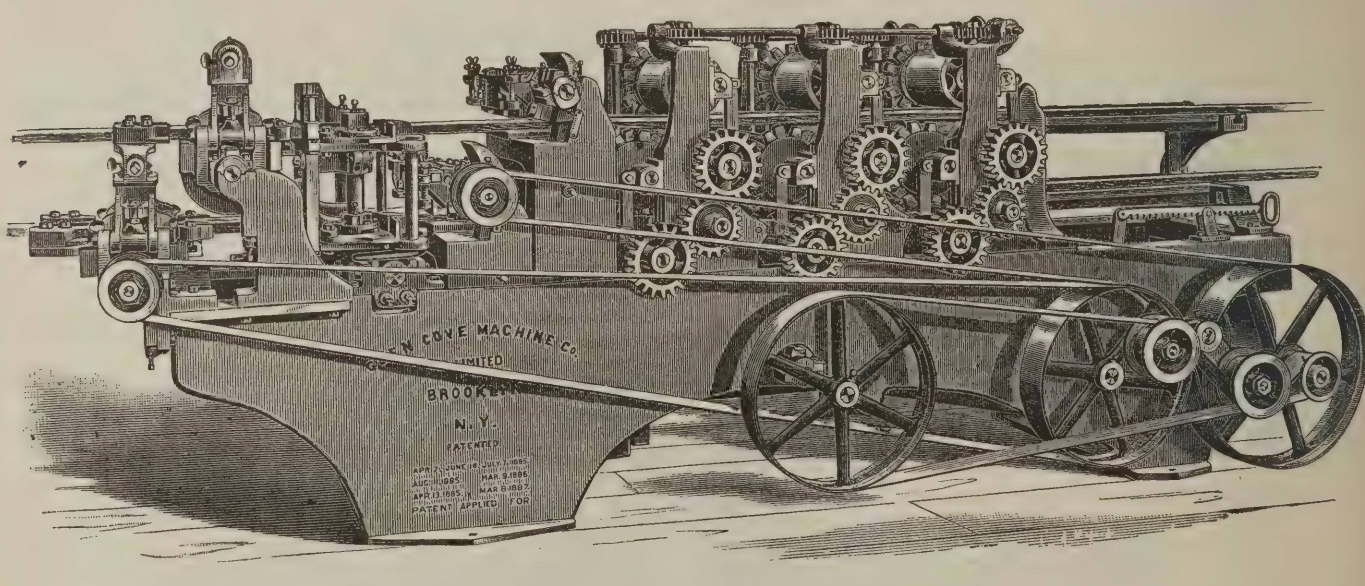
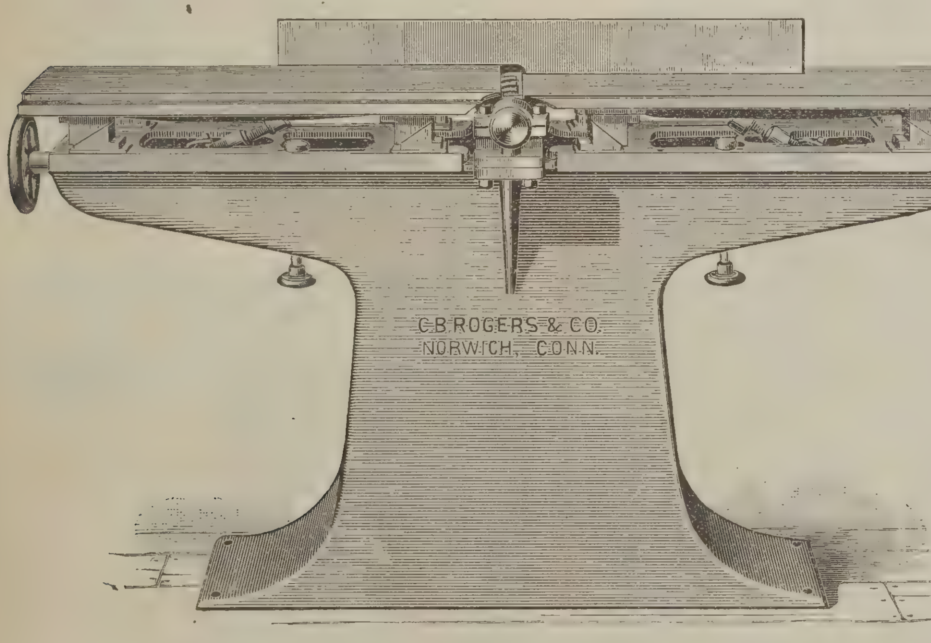


Fig. 7.—Double-Deck Flooring Machine.—Manufactured by the Glen Cove Machine Co., Brooklyn, N. Y.

splintering or tearing out of knots and insures first-class surfacing and matching, while the amount of lumber passing through the machine is still very large. With reference to this machine, the statement is made that it works lumber up to 10 inches wide and at the same time occupies no more space than a single machine of that width. No more belts and no more pulleys are required than for a single machine, and there is no greater expense for attendance. The machine has two side spindles, each one carrying two heads, one immediately above the other, and when it is desired to change the side heads to a different width of lumber, only one side spindle has to be moved to set the two heads. When one is set the other is set, too, and both exactly alike. It is claimed by the makers that valuable time and much trouble is saved, as it takes no longer to set this machine than it does to set the best single board machines in the market. They further state that their patented gripping device for holding the side spindle frames firmly in place after being set, and their patent weighted chip-breaker to side heads will be found on this machine. The top and bottom surfacing heads also have their improved method of raising and lowering and other convenient adjustments.

We are further informed by the manufacturers that, as with all their machines, the cutter-heads are of steel forged solid with their journals; the cutter-head boxes are yoked together; presser-bars and chip-breakers are adjustable; the feed rolls have their parallel movement; the side heads have their patented presser-bar for perfect matching; all the gearing is made from iron cut patterns; the rolls may be raised separately or all together; the shafting is of steel and pulleys are steel rimmed; all necessary guides are furnished to hold the lumber in its place while being worked; every part or piece has its number cast or stamped upon it tofac ilitate ordering duplicates by wire or letter; and all shafts and fittings, including bolts, screws and nuts, are finished to United States standard sizes.



Novelties.—Fig. 8.—Hand Planer.—Manufactured by C. B. Rogers & Co., Norwich, Conn.

Hand Planer.

C. B. Rogers & Co., of Norwich, Conn., with New York wareroom at 109 Liberty street, New York, have brought out the 16-inch hand planer shown in Fig. 8 of the engravings. Machines of this general kind are so generally considered necessary in wood-working shops where planing out of wind, cornering, beveling, chamfering, squaring up, &c., are required to be quickly and perfectly done, that little need be said about the utility of the device. The frame is cast in one piece to prevent the possibility of its getting out of shape if not properly leveled on the floor. The cylinder is of cast steel and runs in self-oiling boxes, and is slotted to accommodate the use of molding or beading cutters. Both sections of the top may be drawn back on the planed ways, allowing easy access to the knives for the purpose of sharpening. Whenever the two sections of the top are set level they can, by means of the handwheels at either end of the machine, be adjusted independently of each other so as to regulate the depth of cut. The table is provided with an adjustable gauge for straight and bevel work. The machine is built in three sizes with tables 5 feet long.

Panel Gauge, Trammel and M asuring Rod.

Fig. 9 of the engravings represents a new tool which the Humphrey Tool Company, of Warren, Mass., are putting upon the market. It is known as Humphrey's Panel Gauge, and combines with this function a trammel and measuring rod. The tool is designed for wood-workers where the work is too wide for the common gauge. It consists of three sections, adapted to telescope together, as shown in the engraving, which represents the tool as partly extended. The sections are held at any length required by the thumb nuts which terminate the different parts, and which are arranged to clamp one part against the other. A smaller nut is provided on the end, which is useful for fine adjustments. A pencil may be passed through the head, and the tool in this form can be used as a trammel. Or the head may be removed, and the bar used as a measuring-rod, being in this form of sufficient length to measure a common window or door. The second engraving, Fig. 10, shows a view of the device end on, so to speak, and indicates the nature of the head and also of the right-angled groove in the head, shown in profile in the previous engraving, by which the gauge is operated. The model before us is well made, the parts being carefully fitted and the workmanship excellent. The sections of the rod are plated, and the head japanned. This tool takes the place of a common gauge where the work is too wide for it. The old way was to use a bar of wood or a strip of metal, according to circumstances, which at best was unhandy, not only in use but to take care of when not in use. The compact form in which this tool can be placed when out of use is in itself a great advantage. The tooth is extended on the top side, so as to be used as a point or pivot on which to swing when a pencil is passed through the head, converting the tool into a trammel. Each end of the rod is furnished with a point to facilitate the use of the device as a measuring-rod. By this means the points of contact, as for example for measuring a door or other opening, are reduced to the smallest possible surface.

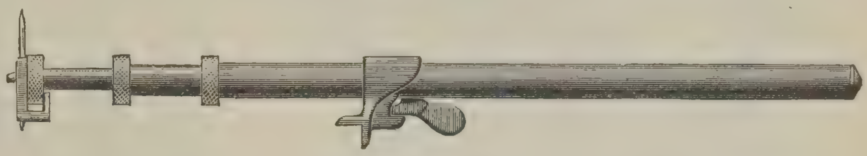


Fig. 9.—Panel Gauge, Trammel and Measuring Rod.

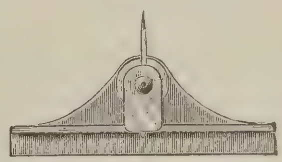


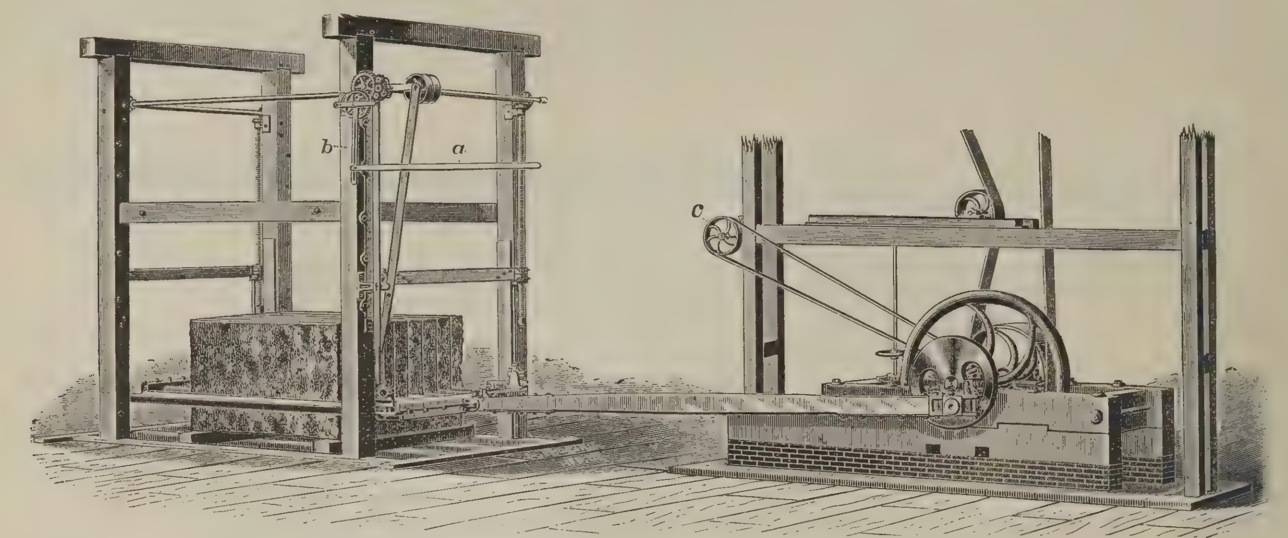
Fig. 10.—End View of Trammel Gauge.

Improved Screw Gang Saw.

The Merriman screw gang for sawing stone, one modification of which is shown in Fig. 11, has been in use for a number of years and has demonstrated itself to be one of the best stone sawing machines made. Its superiority is largely due to the fact that the frame which carries the saws is fed down to the stone by a positive feed which is automatic and adjustable to stone of different degrees of hardness, and at the same time the frame is held firmly down while in action, so that the pressure of the saws upon the stone is uniform. This construction also counteracts the thrusting action of the pitman upon the saw frame, which becomes excessive when the saws are either at the top or bottom of a block, causing a jumping motion of the frame and saws, largely neutralizing their cutting action and destroying the machine itself.

The machine as shown is made by the Lincoln Iron Works, of Rutland., Vt., and has a saw frame of iron, the sides being made of heavy wrought-iron tubing and the heads or ends of 12-inch channel bars, two for each head. These are secured to each other by a strong casting, and when the saws are in it the frame is absolutely rigid. The crankshaft is made of hammered iron, and is $4\frac{1}{2}$ inches in diameter. The bearing on the crank end is forged larger, being $6\frac{1}{2}$ inches, and the pillow block for this end is made adjustable. The crank-wheel, which is keyed on this enlarged part, is made with a counter

weight which balances, or nearly so, the weight of the pitman and its attachments. The wrist-pin is cast on to the crank-wheel and is made of ample size to prevent cutting and wear. The increase of speed and the addition of automatic feeding devices have made a great difference in the amount of cutting one of these machines will do. Some of the later machines have cut as much as 8 inches per hour, actual depth of cut, in Bedford, Ind., limestone, and as high as from 3 to 4 inches per hour in granite.



Novelties.—Fig. 11.—Improved Screw Gang Saw.—Built by the Lincoln Iron Works, Rutland, Vt.

Elastic Feed Molder.

The machine shown in the accompanying engraving, Fig. 12, is an improvement in molders, which has been recently introduced by Goodell & Waters, of Philadelphia. The machine was designed for the purpose of working center reeds and moldings on bevels, rails and stiles, and the manufacturers claim for it that it is the only machine in the market capable of working stock of the character described successfully and economically. It is represented to be an indispensable tool for shops where expensive and hard woods are used, and is especially adapted to the use of cabinet and furniture factories, picture-frame makers and constructors of hardwood interior decorations. The feed rolls are made of hard rubber, so that the stock may be worked after it has been reduced to the required thickness without injuring the surface or leaving feed prints. The machine discharges its own stock without putting in an extra piece to push the preceding piece out. A sash head or regular slotted molder head, 4 inches in size, may be used on the top spindle. The side spindle carries a head with knives $2\frac{5}{8}$ inches wide. The table drops 18 inches, and the feed rolls may be extended from the fence 4 inches. We learn for the company that a number of these machines have already been put into use in prominent carshops with the greatest satisfaction. A prominent feature of the machine, as will be gained from the preceding description, is its economy. With the ordinary molding machine it is necessary to mold the stock with an excess of $\frac{1}{8}$ inch to offset feed prints. By the use of the elastic feed above referred to, $\frac{1}{32}$ inch of extra thickness is sufficient.

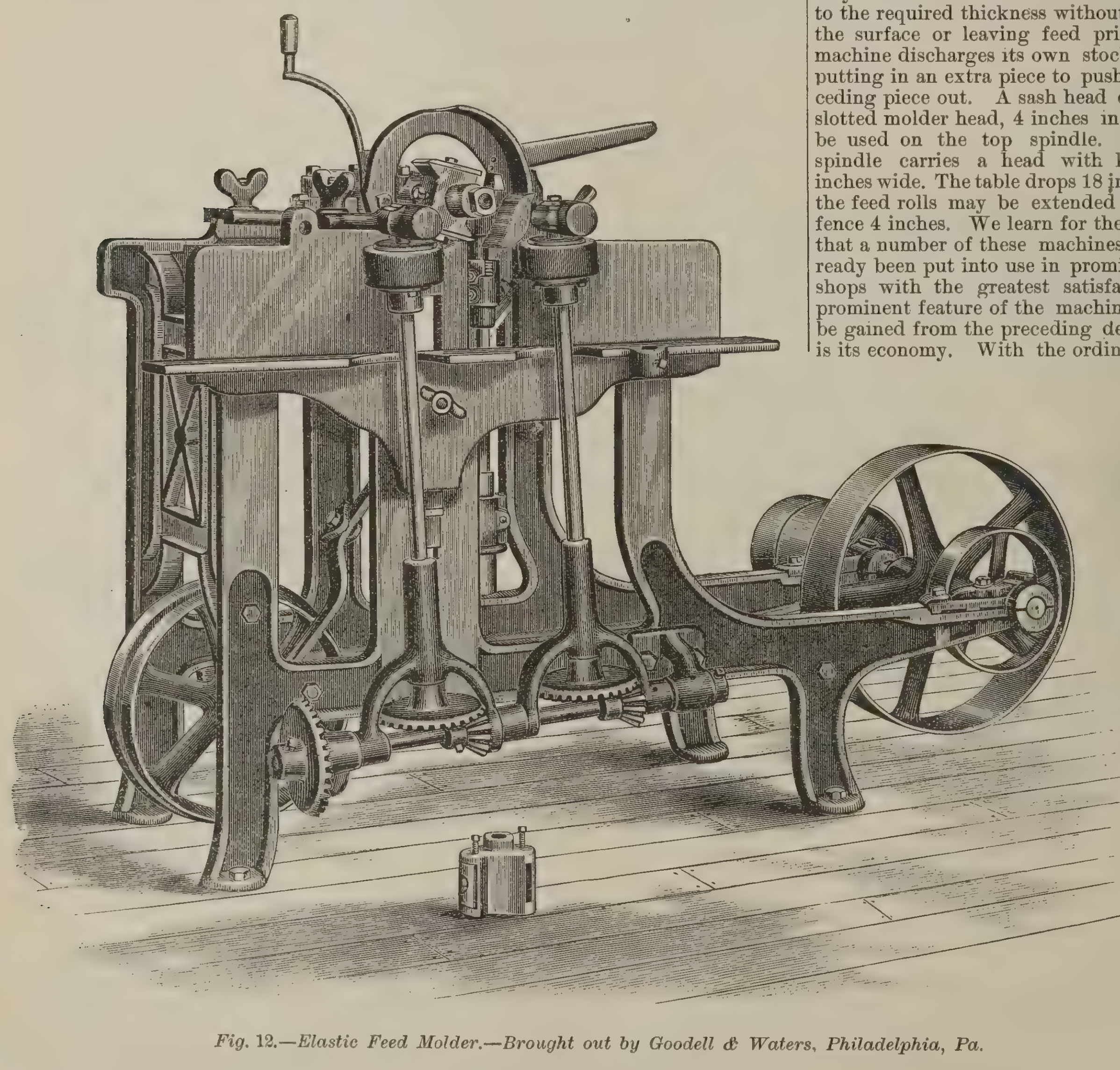
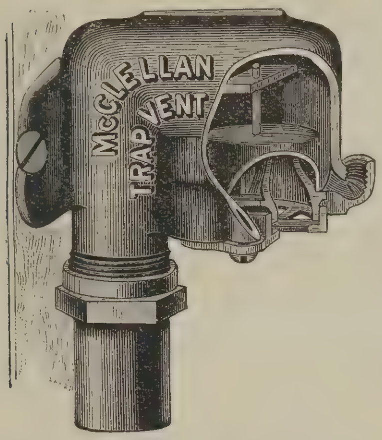


Fig. 12.—Elastic Feed Molder.—Brought out by Goodell & Waters, Philadelphia, Pa.

The McClellan Anti-Syphon Trap-Vent.

Some time ago we illustrated and described quite fully the McClellan Anti-Syphon Trap-Vent, put upon the market by the Dubois Mfg. Company, of this city. Quite recently, however, certain changes in form have been made, which render it desirable to present new illustrations of the device. In Fig. 13 the ordinary form of the trap-vent is shown, the broken part on the right revealing the



Novelties.—Fig. 13.—Broken View of the McClellan Trap Vent.

shape and position of the thimble and cup, as well as the channel through which the mercury is poured. Fig. 14 is a general view of the new form of the McClellan Trap-Vent. The two principal improvements are the position of the vent-pipe and the bracket arrangement for holding the device. The vent, it will be noticed, is at the side, whereas in the other form it is at the bottom, as shown in Fig. 13. To support the trap-vent two lugs are cast on each side and a bracket with a vertical pin is provided over which the lugs slip, as indicated in

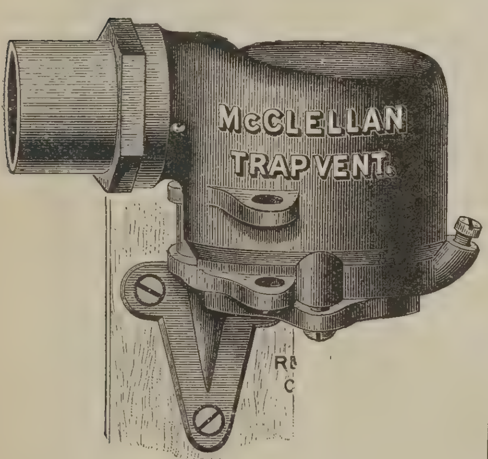


Fig. 14.—General View of New Form of McClellan Trap-Vent.

Fig. 14. The device may be attached to either side, the lugs shown in the illustration being duplicated on the back of the article.

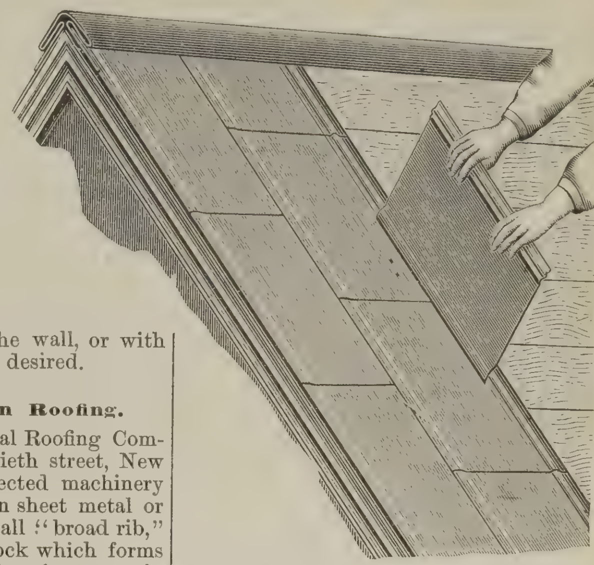
Water-Hammer Cushion.

A new device of interest to plumbers, recently put on the market by Thomas Kelly & Bros., Chicago, is illustrated in Fig. 15 of the engravings. A its name indicates, the object of this attachment is to prevent the water-hammer in pipes due to a sudden stoppage of the flow. The device consists of a cylindrical chamber which, by means of a screw joint, is attached to the end of a water-pipe. Within the chamber are a number of rubber balls, as shown, which being compressible prevent the sudden jar that would otherwise occur when a column of water was driven up the pipe. The device, which may be attached to either lead or iron pipe, is also provided with lugs to screw to the wall, or with opening for a faucet, if so desired.

Fig. 15.—Water-Hammer Cushion.

New Form of Iron Roofing.

The National Sheet Metal Roofing Company, of 510 East Twentieth street, New York, have recently perfected machinery for making a style of plain sheet metal or iron roofing, which they call "broad rib," from the fact that the lock which forms the rib extends, when the sheets are in place, from the eaves to the comb, and is broad in comparison to the thin knife-edge ribs of the ordinary standing-seam roof. The rib is formed of the Walters's patent lock, and is the same as that used on the shingles made by the same company. This lock has been thoroughly tested during seven years, and it is significant that over 17,000,000 square feet of shingles constructed upon this plan are already in use in the United States and Canada. The accompanying engraving, Fig. 16, shows the appearance of the roof in place and the manner of application, while Fig. 17 is a section through the lock, full size. The reader will notice that this application of the lock does away with a very large proportion of the work necessary in laying standing seam roofs as ordinarily applied, such as tongueing up the seams, double seaming, capping the ribs or riveting the ribs, and making and using cleats or other fastenings. Each sheet composing this roof has a cleat-



New Form of Iron Roofing.—Fig. 16.—Method of Applying Roofing and General Appearance of the Roof Produced.

ing flange its entire length the same as the shingles already referred to. This admits of fastening the roof in place to the roof boards with any required degree of strength. The fact that the flange extends the entire length of the sheet is important, for workmen are often disposed, when the supply of cleats or fastenings is limited, to make the fastenings to the roof boards further apart than the safety of the roof would demand. In case of wind storms it is such fastenings that hold the metal to the roof boards. In this roof, in the sizes that are at present manufactured, the cross seams occur 25 inches apart. Their frequency gives strength and rigidity not ordinarily found in iron roofing. The company are at present manufacturing roofing out of 20 x 28 material, but there is no reason

Fig. 17.—Full Size Section through Side Seams.

why longer sheets should not be employed, unless possibly because of the facility with which the present size can be handled and put in place. We are assured that roofs having a fall as slight as 2 or 3 inches to the foot can be successfully covered by this plan. The material used for this roofing is imported sheet steel, hard rolled, tough and durable, and which is thoroughly coated on both sides with oxide of iron and linseed oil paint. The company are also manufacturing the same form of roofing to order out of tin plate.

The Thorn Shingle and Ornament Company, of Philadelphia, Pa., exhibit at the Centennial Exposition of the Ohio Valley, now in progress in that city, a model showing the application of their metallic roofing shingles, hip rolls, ridge coping and cresting. The arrangement is very carefully made, and attracts considerable attention on the part of those for whom such work has interest.

TRADE NOTES.

THE JAMES L. HAVEN MFG. COMPANY, Cincinnati, Ohio, are directing attention to the steam, hydraulic and hand power elevators and dumb-waiters of their manufacture. Speed, safety and satisfactory service are guaranteed.

THE RUSSEL & ERWIN MFG. COMPANY in another part of this issue call attention to the Home door check and spring, an article which closes the door noiselessly and which is already in extensive use on numerous dwellings, public buildings, stores, offices, &c.

UZAL CORY & Co., 210 Water street, New York, are directing attention to Cory's Excelsior gas-tight furnaces, for anthracite or bituminous coal, ranging in price from $35 to $125. They are recommended as being powerful and economical heaters, having heavy castings and large radiating surfaces.

FEW PEOPLE, except those who are immediately concerned in building construction, are aware of the large amount of paper that is used about a building and how important a factor it is in modern construction. Paper prevents the air and moisture from penetrating a building, and for this purpose is the most serviceable material that can be used. Various qualities of paper are in the market. The objection is sometimes raised to rosin-sized paper that it is more or less porous, and consequently fails to perform the special work required. In the effort to overcome the defects of other papers W. F. Bird & Son, of East Walpole, Mass., are manufacturing a paper which they claim is absolutely air-tight and water-proof, and which they are putting on the market at a price only slightly in advance of rosin-sized sheathing.

THE WELL-KNOWN FIRM of James B. Scott & Co., Pittsburgh, who make a specialty of Scott's extra-coated roofing plates, are sending to architects, contractors and builders a pen-wiper that is attractive in appearance and useful for the purpose for which it is intended. In their circular accompanying the pen-wiper they say that they hope that it will act as a reminder of their material when specifications are being written.

JOSHUA OLDHAM, corner of White and Elm streets, New York, has issued a most entertaining book relative to saws, machine knives and other tools. This book is cloth bound, and in addition to matter of great importance, has features warranting it a place in every library. The frontispiece of the book is an excellent portrait of Mr. Oldham, and the special literary feature which gives the book high rank is a history of the manufacture and use of saws, prepared by him. This history traces the invention of the saw from the ancient Greeks. about 1200 B. C., down to the present time. The treatise is illustrated by reproductions of quaint woodcuts showing saw mills and other machinery more or less intimately connected therewith, of a form to be of the greatest interest to the reader. Ten full-page plates are devoted to this subject. We understand that Mr. Oldham is prepared to send a copy of his work to every reader of *Carpentry and Building* who may apply for the same.

IN THE LAST ISSUE of this journal we referred to the catalogue of tools issued by a prominent Chicago house, giving the name as Kelley, Johnson & Bliss. The name is Kellogg, Johnson & Bliss. This mistake has not prevented the firm from receiving a large number of letters applying for a copy of the catalogue which they have issued. They request us to state that they are specially anxious to obtain the addresses of mechanics in Ohio and Michigan and the States west and northwest of Chicago. The catalogue referred to, which is well worth examination, has been prepared for circulation through the territory naturally tributary to Chicago. Those of our readers who have not already received a copy of this book, and who would naturally send their orders for tools, &c., to Chicago, will profit by applying for a copy.

THE PALMER HARDWARE MFG. COMPANY, Troy, N. Y., have issued an illustrated catalogue of their labor-saving hardware specialties—a veritable carpenters' hand book—which they inform us they are desirous of giving a wide circulation. They say they are ready to send a copy to every applicant.

THE GAGE TOOL COMPANY, Vineland, N. J., a short time since in making a boring in the earth, encountered wood at a depth of 185 feet. They have inclosed us some samples which are veritable curiosities. The decayed condition of the chips, as well as the depth at which they were found, gives wide room for speculation. We understand that the boring has over 140 feet of water, the water level in Vineland being about 20 feet from the surface.

WE ARE INDEBTED to Samuel Cabot, No. 70 Kilby street, Boston, Mass., Manufacturer of Creosote Wood Preserving Stains, for the following account of an instance of the fire-proof qualities of wood treated with creosote, which occurred quite recently at Youngstown, Ohio: "A barn belonging to J. W. Tibbetts had been partly painted with oil-paint and partly creosoted. Shortly afterward a mill standing within a few feet of it was burned to the ground and the barn was saved with great difficulty On examining the side exposed to the heat, the places where it was unprotected and where paint had been used were found badly charred and in some cases burned through, while the wood on which the creosote stains had been used was unaffected by the heat and the stain color unchanged. We have heard of creosoted timbers being only slightly charred after a conflagration, but should be interested to hear of such an effect as that above described, obtained by a brush coat of any other preparation."

W. F. & JOHN BARNES, Rockford, Ill., have issued a new price list and descriptive catalogue of their wood-working foot, hand and steam-power machinery. It is a pamphlet of 68 pages, handsomely printed, profusely illustrated, and well worth the attention of all who require anything in this line.

THE CHARLES W. SPURR COMPANY, 465 East Tenth street, New York, are sending to the building, furniture, piano and organ trades, and to others who use ordinary veneers, a little pamphlet that is more than usually attractive as an advertising devise. It is entitled "A Veneer Without Fault or Blemish." The cover of the pamphlet is a thick, felt-like paper, on which the title is printed in reddish ink. The inside pages are of excellent quality of paper and fine typography, with very little matter to each page, so arranged as to catch the eye and cause the reader to turn from one to the other, thus perusing the book from beginning to end. The argument throughout is with reference to special veneers which the Charles W. Spurr Company supply. Those of our readers who have not received a copy of this pamphlet will do well to send for one.

HENRY T. MERRIAM, Millbury, Mass., invites the trade to send for estimates of general builders' ironwork, improved drinking fountains, and other articles of his manufacture. The design of one style of drinking fountain is presented in his card on another page.

THE SAMSON CORDAGE WORKS, 164 High street, Boston, Mass., are offering to our readers samples of their Solid Braided Window-Sash Cord. They represent this article as the most durable and economical now before the public.

WE ARE INDEBTED to the Builders' Exchange of Baltimore, Md., for a copy of their constitution and by-laws bearing date July last. The objects of the Exchange are declared to be the advancement and promotion of the general interests of the city of Baltimore, and more particularly the encouragement, advancement and protection of the building and manufacturing interests of the city. The constitution is prefaced by a list of the officers for the current year, including committees, and also a list of members

MANY OF OUR READERS require steam engines for use in their shops. Those who have not investigated the subject have no idea how cheap steam-power is and what an important advantage power machinery has. To those who are about to buy steam engines, the advertisement of the New York Safety Steam-Power Company, which appears upon another page, will be of special interest. This company offers an illustrated catalogue free on application, and are in position to furnish desirable information to those who will correspond with them concerning their wants. The engines made by this company have an enviable reputation, and are built in various sizes and sold under guarantees.

THE VENETIAN BLIND COMPANY, Burlington, Vt., have removed their New York office from 1103 Broadway to 18 Cortlandt street. This company manufacture Hill's patent inside blinds; also English and American Venetian blinds.

THE CINCINNATI CORRUGATING COMPANY, 147 Eggleston avenue, Cincinnati, Ohio, direct attention, in another part of this issue, to the advantages of sheet steel in place of sheet iron for roofing plates.

THE THORN SHINGLE AND ORNAMENT COMPANY, N. W. corner Twelfth and Callowhill streets, Philadelphia, direct attention in another part of this issue to their square nosed tile, a very satisfactory illustration of which is presented. Sheet-metal shingles are now a staple article of manufacture, and builders are learning to select their goods with respect to design in view of the kind of buildings to be covered.

H. MAACK, Principal of the Academy of Architecture and Building, No. 3066 South Ninth street, St. Louis, Mo., announces that the terms begin September, December, and March. We have referred to the features of this institution in the past.

THE ADVERTISEMENT of Ellrich & Co., Plantsville, Conn., is of the nature of a coupon this month, and is good for a certain amount when used in ordering some of their labor-saving tools. Our readers will not fail to avail themselves of the advantages of this offer.

E. D. STAIR, 7 West Fourteenth street, New York, is directing the attention of architects and builders to what he describes as "Boston Hard Wax Polish," for floors and woodwork. One pound, it is stated, will cover 200 square feet.

L. H. OLMSTED, Corona, N. J., presents in another part of this issue, Olmsted's Mitre Box, an article made of hard wood, fitted with adjustable saw guides. He invites the trade to send for circulars.

THE CHAMPION SAFETY LOCK COMPANY, 21 and 23 Champlain street, Cleveland. Ohio, direct attention in this issue to the Champion Safety Lock, two styles of which are illustrated.

Laying Foundations.

The foundation of a building, says Sir J. Gowans, is of primary importance, as, unless it is secure, the permanency of the structure cannot be maintained, however well built it may be. Before laying a stone, the architect or engineer should be satisfied that the strata will give equal resistance to the pressure that may be put upon it. Strata that are hard and soft are very dangerous. Even clay if mixed with bowlders (which oftens happens) cannot be depended upon, unless they are removed, and means taken to equalize the ground on which the buildings are to be erected. Next to rock, no better foundation can be got than sand or gravel when dry. If wet, means should be taken to drain away the water; but, if this cannot be done, large flat bedded foundation stones of sufficient area, fairly dressed in beds and joints and well put together, will, as the load increases, secure a foundation that anything can be built upon. In my own experience I have often tested this, and particularly when building a bridge on a railway contract I had many years ago. This was an under bridge of considerable span, the girders being in the form of an arch, in segments of cast iron, the security of which depended greatly on the permanent resistance of the abutments, or the bolts which held these segments together at their joints. In digging for a foundation it was found that the strata were very soft, being layers of sand and moss alternately, and to prevent failure I took the precaution to strengthen the foundation of the first abutment by driving piles to a depth of 30 to 40 feet, with horizontal planking, on which the foundation stones were bedded. Before building the second abutment, acting on the advice of a railway contractor who had had more experience than myself, I adopted a different plan—viz., to dig out the soft material to such a depth and area as secured an outward resistance to meet the pressure of the large-sized stones that were afterward put into the foundation, course after course, until the load pressed out the water, and so secured a foundation which was equally as strong, if not stronger, than the first. Where the stratum is unequal or not to be depended upon, I know of nothing better than a good bed of concrete, certainly not less than 3 feet thick, and no architect should neglect this where there is the slightest doubt as to the sustaining character of the ground. This is always necessary in erections of different hights, and is particularly required in churches and other buildings where the spire, tower or other elevation bears more heavily on the foundation than the walls which abut upon them. And, in addition to this, and to make sure, I would have extra courses in the foundation of the higher and heavier portions, as in the hurry with which we build nowadays every precaution is necessary. The same care should be taken with respect to oriel windows or projections which do not go to the full hight of the building, and consequently have not the same pressure on the foundation. The walls to which these lighter projections are attached should not only be well founded, but the tie or bond which unites the one wall to the other should be left free on the upper beds, so as to allow for the subsidence of the heavier wall without causing the fractures so often seen where this precaution is not taken.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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NOTES AND COMMENTS.

THE RAPID spread and growth of the building association idea is something phenomenal. Starting in a comparatively small and insignificant way, a few years since, building associations have multiplied until their absorption of the savings of the wage-earners of the country is so great as to be actually alarming to the savings banks, upon whose field they are undoubtedly intruding. It is estimated at the present time that there are between 3500 and 4000 building associations in the United States. They are increasing at this time with a rapidity that has perhaps never been equalled in the history of the country, and it is fair to suppose that within the next year, considering the prosperity of the country at large, their number will be very largely augmented.

THE AMBITION of the majority of people who enter a building association is to secure, with the assistance of the association, a home. A lot is bought, plans are discussed, and savings are carefully made. After a time a building association is joined and the future in general is full of hope. A little later the wage-earner, whether he be carpenter, machinist, molder or what not, owns his own little house. The number of small houses erected in the United States every year, including both those which are, and which are not promoted by these organizations, is, unquestionably, far in excess of the number of buildings of any other one class. That there is a constant and growing demand for small buildings, tasteful in design and thorough in their planning and construction is known to our readers at large, and the rapid development of building associations already referred to makes this demand more particularly felt at the present time. In order to meet what we think is a well-defined want, we announce in one of the pages of the advertising portion of this issue what we term "Building Association Competitions." We offer liberal cash prizes for designs of houses costing $1000 and $2000 each. The idea is to produce designs which are particularly adapted to the wants of those who build with the assistance of these mutual savings and loan associations, and who require the best house, all things considered, for the least money.

ARCHITECTS SELDOM give their best attention and talent to small and inpensive structures. Their fees are for the most part determined upon the basis of a percentage upon the cost of the building. An architect of talent, who is well paid on a large structure at the usual rate of commission, cannot afford to work on a small structure at the same rate. For example, on a building costing $100,000 2½ per cent. produces the sum of $2500, which is probably a fair fee for services rendered, but 2½ per cent. on a building costing $1000 is only $25, and is altogether out of proportion to the actual work involved. In fixing the prizes in the XVIIIth and XIXth Competitions above referred to we have taken all this into account and have offered for the first prize in each case the round sum of $100, believing that this is sufficient to warrant architects of ability to give attention to the construction and design of cheap houses. The second prize in each case is $75, which is also a fair compensation for the work involved.

WHAT WE WANT to secure by means of these two contests is the very best designs that the architectural ability of the country can produce within the limitations named, for which the reader is referred to the announcement already mentioned. The successful designs will be published in our usual careful manner, and the special circulation which will be given to this journal by reason of these competitions will carry the names of the successful competitors into many parts of the country where otherwise they would never be known. There are some unique conditions and provisions in the contest, as will be noticed by the reader, such as the means to be employed to determine the relative value of the buildings shown by the designs submitted, and the demand for a certified estimate from a responsible builder. The latter is necessary in order to make the publication of the studies of the greatest possible value. Those who have taken part in previous competitions will appreciate the care that we take in defining these contests in order to secure fair play for all concerned.

THE WORK of erecting the twin towers of St. Patricks Cathedral, at the corner of Fifth avenue and Fiftieth street, New York City, was practically completed the early part of October when the marble cross, which tips the northern spire, was placed in position. The cross is about 4 feet in hight, 3 feet wide and 8 inches thick. Extending through it from base to top is a copper rod, by means of which the cross is secured in place on the spire. The spires are among the highest in the world, and have an elevation greater, we believe, than any other in this country. While these spires give the cathedral a finished appearance, the structure still lacks much of realizing the original plan. There is yet to be built a chapel extending from the main building back between the bishop's house and the priest's house to Madison avenue. This will make the entire structure 400 feet long. A new sacristy will also be built by the northeast corner of the cathedral. When this shall have been completed the one now in use will be demolished. This will finish the exterior of the cathedral and will fill up the entire block bounded by Madison and Fifth avenues and Fiftieth and Fifty-first streets. But there is much interior decoration that will probably not be finished for years. There are several hundred niches to be filled with figures, and there are ten chapels in which altars will be placed. The cathedral has been 30 years in reaching its present condition. The corner-stone was laid August 15, 1858. It was dedicated May 25, 1879, when it was practically completed. Meantime there have also been built the bishop's house, the priest's house, both on Madison avenue in the rear of the cathedral, and the school on Fiftieth street.

THE ARCHITECTURAL LEAGUE makes the announcement that in connection with its exhibition, it has instituted an annual competition which is open to all draftsmen in the United States under the age of 25, the object of such competition being the promotion of good designs and the improvement of draftsmanship. The conditions for admission to the competition are that the competitors shall be residents of the United States, and under the age of 25, that the drawings shall be made in conformity with a prescribed programme, and in all parts and portions entirely by the hand of the competitor. The drawings will be judged by a jury appointed for the purpose. The successful drawings and such others as may be deemed worthy, will be hung at the exhibition of the League. Copies of the programme for the second annual competition may be obtained by applying to E. R. Tilton, secretary of the Medal Commitee, 23 Warren street, New York City.

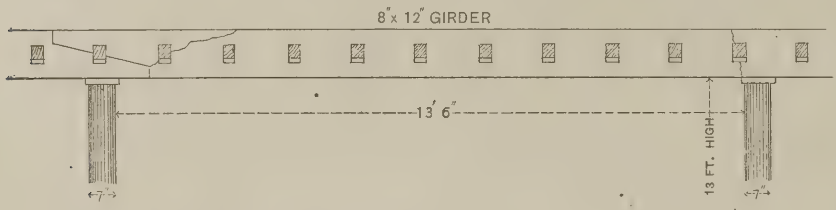
THERE ARE MANY phenomena connected with the burning of theaters and other large buildings which it is very difficult to explain. As fires of this nature are apt to prove disastrous to both life and propesty, it is not surprising that a great many investigations have been made with a view to guarding against such conflagrations. Not long since an engineering society in Austria investigated the subject of theater fires, and for the purpose of getting as much practical information as possible, had built a model of a theater on the scale of 1 in 10, in which they conducted their experiments. It was pointed out that where the fire breaks out on the stage a very quick rise in the temperature in the space behind the curtain rapidly expands the air, and there being no escape for it upward, it is forced out into the body of the theater and thus spreads the flames with great rapidity. The effect of

this volume of air entering the theater is to extinguish all the gaslights, and, at the same time, the carbon gases formed by the combustion overpower the audience and renders them partially or totally unconscious. Experiments were made on the model theater with a view to determining what results will follow if the part above the stage was well ventilated. The experiments were divided into two series. First with the stage as usually constructed, and the second provided with ample ventilation. As a substitute for fire, about 5 pounds of paper was burned in the proscenium.

DURING THE FIRST series—that is, where no ventilation was provided, the curtain was forced out in about 17 seconds after the ignition and 19 seconds after the gas jets were extinguished. It may be remarked that the extinguishing of the gas flames was not due to the rush of air but to the pressure which forced the gas back into the pipes and thus put out the lights. By these experiments it was found that after 20 seconds the pressure in the body of the theater was equivalent to nearly 7 inches of water, which, of course, is very much greater than the gas carries. Other lights, such as petroleum and candles were put out at the end of about one-half a minute. The second series of tests was made with a ventilating shaft over the stage, covered simply with a disk of paper stretched over a wire ring. The maximum pressure in the theater under these conditions was attained 12 seconds after the paper was lighted, and amounted to less than $\frac{1}{10}$ inch of water in the proscenium, while in the body of the theater there was no excess of pressure. Furthermore, the curtain was not forced outward, neither were the lights extinguished. Regarding the purity of the air in the first series of experiments it was found to be 4 to 6 per cent. of carbonic acid and $\frac{1}{2}$ per cent. of carbonic oxide, while in the second series of experiments there were only found traces of carbonic oxide, and not carbonic acid. The laws in this city governing the construction of theaters would seem to have anticipated these experiments, as the ventilation of the stage is expressly provided for.

THE APPALLING accident which recently occurred at the ceremonies attending the laying of the corner-stone of a church at Reading, Pa., whereby nearly 100 persons were more or less seriously injured by the falling of the church floor, teaches a lesson which should sink deep into the minds of all connected with the building trades. It also emphasizes, in a very forcible and striking manner, the imperative need of proper inspection by disinterested, yet competent, persons of all platforms, stagings or floorings of whatever description, designed to sustain unusual weights. The simple fact that a platform is to be used as a temporary structure should certainly be no excuse for omitting careful examination into its ultimate strength. In fact, the very knowledge that a platform is to be employed for the purpose of sustaining a number of people should at once suggest the necessity of a rigid inspection of the workmanship, materials employed and other features of construction. A temporary platform is likely to be crowded to excess, and the swaying movement of a great mass of people may break down a structure that might possibly under ordinary circumstances bear their weight. From the frequency with which such accidents occur, it is difficult to resist the conclusion that careless workmanship as well as insufficient planning exist in many more cases than is generally supposed. Where the lives of human beings are involved, as in the case of nearly every structure erected, too great care cannot be exercised in making every part sufficiently strong to safely perform the work expected of it.

SINCE THE ABOVE was written we have received from an intelligent builder in Reading sketches of the floor beams in the church in question, showing how the work was put up and the point where it broke. These we have had engraved, and we now present them for the scrutiny of our readers. Our correspondent informs us that 7-inch water pipe was used for the posts. The girders were 8 x 12 inches in size of white pine and were mortised to receive the floor joists, as indicated in the sketch. The posts were 13 feet, 6 inches apart, and in this space ten floor joists, 3 x 12 inches in size and 19 feet long, were placed. No caps were put upon the posts. The mortising weakened the girders very considerably, and the result was a fracture near the splice and a corresponding fracture directly over the next post. A comparatively small strain was required to start the break-down, and after it was started there was nothing to check it. Had the post been provided with caps the result would, no doubt, have been different, and, in turn, had the joists been laid on the girders instead of mortised into the girders, it would also have been far better. The use of water pipe for posts—when properly designed iron columns are a staple article everywhere—indicates gross carelessness or else absolute ignorance. The coroner's jury impaneled to inquire into the death of some of the victims of this disaster censured the boss carpenter and the superintendent of the work. The lessons to be grained from this disaster are so apparent that it is scarcely necessary to occupy further space in their discussion.



Floor Accident at Reading.—Diagram Showing Construction of Floor.

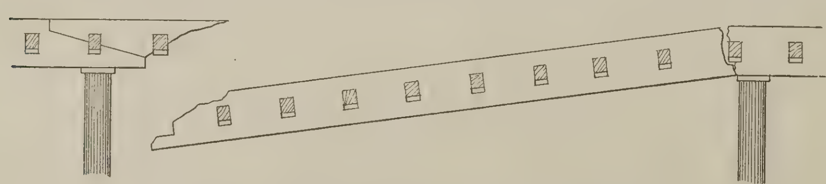


Diagram Showing How the Girder was Fractured.

THE PLATES.

In Plate XLI there is presented a design of an Italian renaissance cabinet that will bear very close examination. The work was designed by C. Trapnell, and is a very happy illustration of the style indicated. It is a cabinet of picked Riga oak, inlaid with walnut wood, and richly carved. The center portion consists of an upper open compartment or arcade inclosed with square columns, and paneled at the back with an inlay of walnut wood and oak. The end compartments are also open, the front posts of which are supported by conventionalized lions, wrought into the structure. The back paneling of this portion is carved and inlaid. The central doors, above and below, also the frieze, are elaborately carved and inlaid. Some brass grilles inclose the upper end doors. The other portions of the work are explained by the drawing itself; and, in almost every detail, this piece of furniture is of the highest finish.

The perspective view, elevations and plan shown in Plates XLII and XLIII, represent a residence built at DeKalb, Ill., some time since, for Mr. W. G. Earle, to plans and specifications prepared by George F. Barber, architect. The price was in the neighborhood of $2800, not including the furnace. Chimneys were provided, built of 4-inch brick wall, around glazed tile set in cement. The corners of the chimneys were left open and employed as vent flues. A cellar, 7 feet 6 inches, was provided under the entire house and finished with cement. The first story measures 10 feet, and the second story 9 feet 4 inches. The shingled roof was painted. Double-thick American glass was employed throughout the building. In the painting, several colors were used, making a design pleasing to the eye, but which it is impossible to reproduce in print. The interior finish was in soft pine.

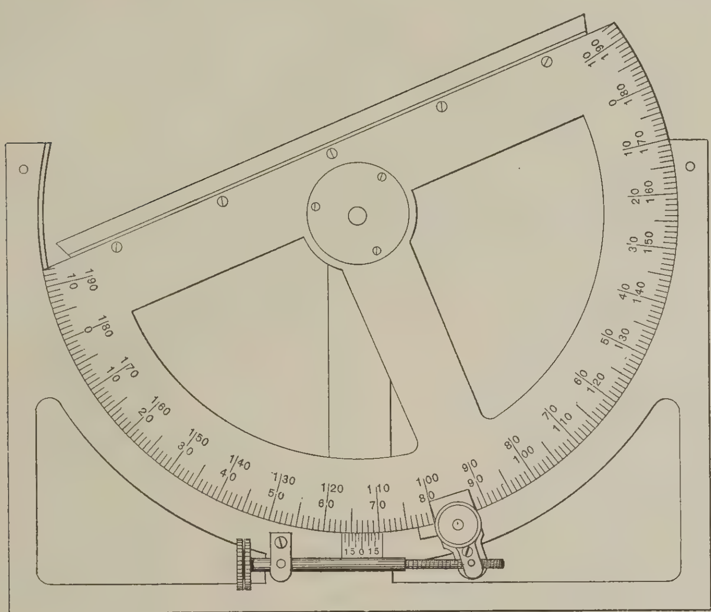
In Plate XLIV we present a number of brick gables, which will, no doubt, afford suggestions to many of our readers concerning the way in which brickwork may be managed. In addition to gables, there are suggestions of chimneys and chimney-tops. The increase in the use of brick for decorative purposes at the present time lends special interest to such a sheet of designs as is here offered.

Another big telescope, dwarfing the instrument in Lick Observatory, is proposed by the University of Southern California. Perhaps in co-operation with Harvard University, a glass will be made 42 inches in diameter, as compared with 34 inches, the size of the Lick glass, and the effect will be to bring the moon within 60 miles of the earth, as it would appear if viewed by the naked eye. Mr. Clark estimates the cost of the glass and the mounting at $100,000.

Hints on Workshop Drawing.

To make scale drawings and to set out the same full size are two very different things, as doubtless many of our readers have already found out. The means employed for the one are in most cases not available in the other. For example, in setting out a simple circle or arc on a scale drawing the ordinary compass, with perhaps the addition of a lengthening bar, will be sufficient for even long radii. But when these same arcs are to be struck full size the ordinary compass is useless, and other means have to be found to accomplish the work. We purpose here considering the less known of the special appliances which are suitable for drawing in the workshop, and at the same time to give a few hints on the subject of mechanical drawing in general.

It may prove useful at the outset if some brief account is given of the knowledge necessary for the ordinary mechanic, whose object it is to make scale drawings and afterward to set them out full size.



Mechanical Drawing.—Fig. 1.—Improved Form of Protractor.

The first difficulty experienced by the beginner is that of gaining a steady hand, in order to insure accuracy and precision in the work. This is necessary not only as an aid to the proper use of the instruments, but also in executing those portions of the drawing which cannot be done wholly by mechanical means. An excellent manner of training the hand with this object is as follows: Take a piece of rough drafting paper and soft pencil and draw upon it a number of curves in different directions. These are

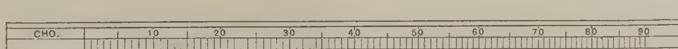


Fig. 2.—Scale of Chords.

to be executed by moving the arm and wrist with a quick sweep, and no attempt is to be made to sketch the curve. Practice in this work should be had by the beginner for 10 or 15 minutes every day, and it will result, after a comparatively short time, in considerably steadying the hand of the operator and fitting him for setting out scale drawings accurately. Having practiced in this way the would-be draftsman should proceed to obtain a good knowledge of plane geometry, with a general understanding of the principles of solid geometry and orthographic projection. There are many manuals published which are suitable for the beginner and he cannot do better than to purchase one and work out the problems in it from beginning to end, taking care that the principles of each one are thoroughly understood before proceeding to the next. It is necessary here to observe that a thorough knowledge of geometry must be acquired, rather than simply the manner in which certain problems are to be worked out. In actual practice problems frequently arise which can only be solved by the application of geometrical principles, and to become thoroughly familiar with these principles should be the first object of the learner.

Scale drawings will be required in all classes of work, and to fully understand what a scale is, and how it is made, will be the next proceeding. In the manual of geometry referred to an explanation will probably be found of scales in general, but some mention of them may be offered here. A scale drawing is one made to some scale, either less or more than full size. Ordinary plans and elevations of the architect and builder, say those drawn to scale of ¼ inch to the foot, will be an example of the first, and certain of the working drawings of the watch-maker and jeweler, who have the minute parts drawn to two or three times the full size, will be an example of the second. The scale to which a drawing is made may be either distinguished by comparison of one measurement to another, as for instance, ¼ inch to 1 foot; 1 inch to 1 yard, &c., or it may be indicated by the proportional fraction, as $\frac{1}{12}$, $\frac{1}{25}$, $\frac{2}{17}$, &c. Thus, supposing we have a rectangular table top which measures 4 feet 6 inches by 6 feet, and we draw a rectangle on paper which measures 4½ inches one way and 6 inches the other, it is clear that every inch on the drawing represents a foot or 12 inches on the table. The scale in such case is said to be "one inch to the foot" or "one-twelfth." In most parts of the Continent of Europe the latter plan is followed, while in America and in England the former plan is usually observed. There is, however, an objection to the last designation of the scale. Carpenters and others frequently talk about a "quarter" scale, meaning one of ¼ inch to the foot, when really a quarter scale means one-fourth full size, or 3 inches to the foot. For measuring small lengths, such as a tenth or a hundredth of an inch, the diagonal scale is very useful, and a de-

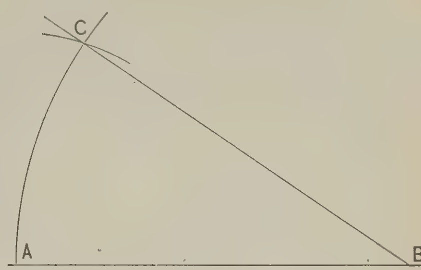


Fig. 3.—An Angle of 34 Degrees as Obtained from Scale of Chords.

scription of it will be found in the issue of this journal for February, 1887. In addition to a knowledge of the subjects already mentioned it would be advisable that some practical acquaintance should be had of color, inking in, &c.

It will frequently happen that angles have to be set out in the workshop, and the means by which they may be accurately determined may be obtained from any of the text-books already referred to. Angles of 45, 30, 60 and 90° are obtained from wooden or hard rubber triangles, and by bisecting either of these other angles may be obtained. The protractor is used in setting off angles, but this instrument is usually not very reliable. When it is employed the greatest care must be taken to

Fig. 4.

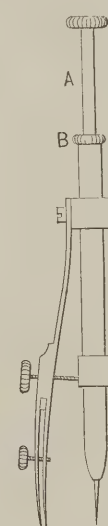


Fig 5.

Spring Bows for Large and Small Circles.

see that it is properly adjusted. In forming polygons and a variety of other cases a really accurate protractor is exceedingly useful. One of the best and most practical protractors in use is known as the Crozet, which is illustrated in Fig. 1. This instrument, as will be seen from the engraving, is set in a frame having right angles. It is used by being placed on a T-square or straight-edge and then the required angle can be accurately set off without the troublesome task of bringing the center of the protractor over the starting point. By an adjusting screw and vernier the precise number of degrees is determined. Although the price of this instrument is high, it is probable that is would soon pay for itself. Another manner of setting out angles, and one which is not so well known as its simplicity and accuracy would warrant, is that of using the "scale of chords." This scale is found marked "C." or "Cho." on most rules

supplied with boxes of instruments and is illustrated in Fig. 2. By it an angle may be set off much more accurately than with the ordinary form of protractor; the method is as follows: Having drawn the line A B (Fig. 3), with which it is required to make an angle of 34°, first take in the compasses from the scale a distance equal to the length from 0 to 60 and with it as radius describe an arc from the center B. Now take from the scale a distance equal to the angle required, in this case 34,

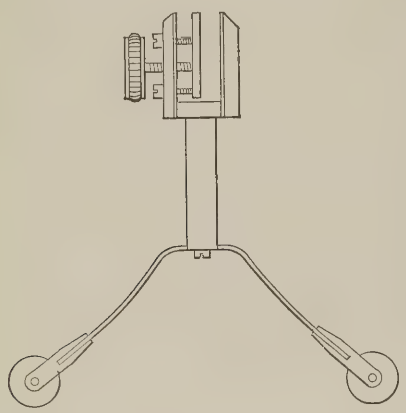


Fig. 6.—Wheel Attachment for Beam Compass.

and from A draw a second arc intersecting the first at the point C. Join C B by a straight line and the angle A B C of 34° is drawn as required.

Getting out a circle or arc frequently causes a deal of trouble in the workshop. It is comparatively rare that provision is made for long radii other than by using the ordinary compasses and trammels. For the sake of completeness we will consider how a circle or an arc may be struck from the smallest radius to the largest. The method will obviously depend upon the length or the radius. Very small circles are usually put in with spring compasses, such as that shown in Fig. 4. When the circles are very minute the German form of spring bows should be used. This is represented in Fig. 5, and by it may be drawn circles much smaller than a pin's head. The construction differs from the ordinary bows. The center rod, A, is stationary and acts as a

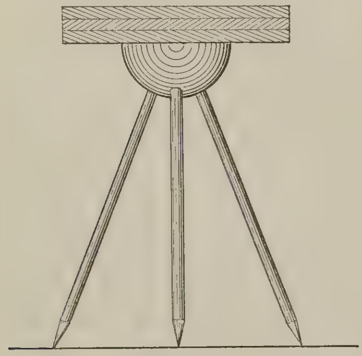


Fig. 7.—Portable Center Stand for Striking Circles.

pivot while the pen point is turned around by twisting the inner edge B between the thumb and forefinger. Large circles may be turned with the ordinary compasses, with the addition of a lengthening bar when required. In setting out most full size drawings the beam compasses are used. Of this there are a number of different kinds which are sufficiently well known to make it unnecessary to give any special description of them here. The beams employed are usually of hard wood, sometimes rectangular and often T in section. In most shops three different lengths of beams are kept which are used as they are required. In using the long trammels there is an objection that the beam bends somewhat, and that the arc is not always true on that account. To prevent this a wheel attachment, shown in Fig. 6, is recommended. The ordinary trammel heads are placed on the beam at a proper distance out with the wheel attachment in a suitable position between them. Arcs struck in this manner are very true and uniform, and the instrument is one which is of great value, especially if the beam consists of a double jointed rule.

To provide permanent centers from which circles may be struck is frequently overlooked in the workshop and drafting-room. When the radius is long the drawing has to be placed on the floor, the result being most unsatisfactory. A thick piece of board is useful for the purpose of supplying a temporary center, and it may be attached to the drawing-table by means of a screw-clamp. A much better plan than this, however, is to have a proper stand for centers, and a suitable form for this purpose is represented in Fig. 7. It consists of a flat stand, composed of several thicknesses of soft wood with the grain reversed and set on a leaden hemisphere, in which are set tripod legs formed of iron with sharp points. The whole appliance is heavy and the sharp points stick in the floor and prevent it from getting out of place. The centers are turned in the soft wood top, but as it frequently

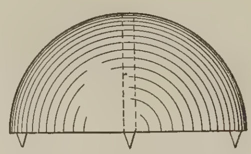


Fig. 8.—Permanent Center for Striking Circles.

happens that a number of arcs have to be struck from the same center, something is advisable more permanent. A very good form for such a center is constructed by placing a small hollow cylinder in a piece of lead, as shown in Fig. 8, and, by means of a small metal plug or three projecting points, this may be readily attached to the wooden board of the stand.

In a former number of this journal a correspondent pointed out how objectionable the ordinary thumb tacks are for pinning down drawings, and suggested that some form of clip should be used for the purpose, one of which was illustrated. The writer would suggest that if the same idea was carried out as applied to a pin, instead of being fixed to the board, it would prove of considerable use. What is suggested consists of two metal plates, between which the paper is held. The under plate is hinged on and is provided with a small hole, through which passes the pin which is fixed to the top plate.

The necessity which arises in setting out ordinary full-sized drawings of repeating a molding or a number of points, the relative positions of which have to be very accurately maintained, gives rise to not a little work. Many persons transfer such a series of points by marking them off on to the straight edge of a piece of thin paper. It is suggested, however, that inasmuch as this entails a certain likelihood of inaccuracy that some simple instrument or appliance might be employed with advantage. A wooden beam having upon it a number of small trammel heads available for fixing thereto by means of the ordinary thumb-screws would answer the purpose. Such trammel heads should be of light construction and small width.

A Novel Industry.

One of the most novel industries of which the State of New Jersey can boast is that of mining huge cedar logs from the swamps existing in the neighborhood of Dennisville. The fallen and submerged cedar forests of Southern New Jersey are said to have been discovered 75 years ago, since which time they have been of interest to geologists and scientists alike. The buried forest lies at various depths in the swamp, and the uncovering of the trees or working the "cedar mine" is done in a very simple and easy manner. The log miner enters the swamp and prods in the soft soil with a long, sharp iron rod The trees lie so thickly beneath the surface that the rod cannot be pushed down amiss on its testing errand, for the prodding is not so much in search of a tree as it is to test whether the tree is a "windfall" or a "breakdown." When the prod strikes the log the miner chips off a piece with the sharp point of the tool, which brings the chip or splinter to the surface when drawn out of the muck. By the appearance and order of this chip the miner can tell at once whether the tree he has tested is a sound or a dead one. If the former, he quickly ascertains the length of the trunk by prodding along from one end of it to the other.

That ascertained, he proceeds at once to raise the log from its hidden bed. He works down through the mud a saw similar to those used in sawing out ice in filling an icehouse. With this he saws the log in two as near the roots as he cares to. The top of the tree is next sawed off in the same way, and then the big cedar stick is ready to be released from its resting place. A ditch is dug down to the log, the trunk is loosened by cant hooks, and it rises with the water to the surface of the ditch. A curious thing is noticed about these logs when they come to the surface, and that is that they invariably turn over with their bottom sides up. After mining, the log is easily "snaked out" of the swamp, and is ready for the mill or factory.

The uses to which the cedar logs are put are many, but the principal use is the making of shingles and staves. The longevity of articles made from the wood is shown in shingles, tubs, pails and casks made from it over 70 years ago, and which have yet to show the slighest indication of decay. The shingles and staves are worked into shape entirely by hand, the only machine work that is permitted in manipulating the cedar logs being the sawing of them into proper lengths for the uses to which the lumber is to be put. The Dennisville cedar shingles are said to command a price much higher than the best pine or chestnut shingles.

Thinking in Stone.

There was a period of the Middle Ages, says A. Wilson, when men thought in stone. Turning with dissatisfaction from the Latin hymnsof Abælard, the rude grotesque miracle-plays, and the chiefly barren disputes of the schoolmen, to the cathedrals of Florence, Pisa and Lucca, of Nuremburg, and other towns in Central Germany and Flanders, the abbeys of England and Scotland, the Gothic castles, and even many rude robber strongholds, it is not difficult to see that the highest thought and feeling of the time found in those marvelous piles—those springing arches, calm falls of light, depths of shade, and doors whose beauty well deserved to last for aye—the most fitting representatives and vindications of the higher efforts of man—of man making the earth more beautiful as it rolls among the stars, working according to the will of the Eternal Father, who looked down from

above, consecrated to the work in the solemn place while yet a child; and even the memory of the proudest and most victorious perpetuated only by a recumbent statue with humbly clasped hands in acknowledgement of shortcoming but undying aspiration. Each time has new wants, and the tendency has been toward more articulate forms of expression. The power of thinking in stone was lost, as thought found easier and distincter modes, and only imitations of what had been thought in that way were produced.

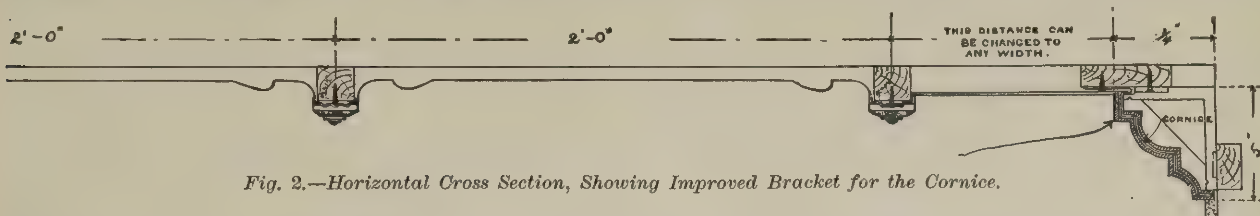


Fig. 2.—Horizontal Cross Section, Showing Improved Bracket for the Cornice.

Kinnear's Metallic Ceilings.

A short time since we referred to patents which had been issued to W. R. Kinnear, of W. R. Kinnear & Co., Columbus, Ohio, on metallic ceilings. We now have the pleasure of laying before our readers a general view of some of the panels of which such a ceiling is composed, together with profile sections showing features of construction. This ceiling, unlike any others in the market with which we are acquainted, is struck up in dies, each panel being of a single piece. The beauty of the ceiling and the finish that is secured by this mode of manufacture will be instantly appreciated by those who give the subject any attention. The machinery which the firm above mentioned have recently perfected is elaborate in character and is adapted to secure various modifications of size in the same press and with the same dies. Accordingly adjustments for variations in sizes of rooms, &c., are easily secured. The catalogue which the firm have recently issued contains a number of designs showing how the work may be arranged in many different forms. Referring to the engravings presented herewith, the large cut shows details of stamped panels indicating variations in size and modifications in profile which are readily secured. It may be remarked in this connection that the rosette ornamentation along the molding panel can be entirely omitted if desired. The panels are in single pieces, as above described, and are arranged to lap and interlock in a way to form a complete sheet-metal ceiling, while the points of junction, such as corners, are emphasized by rosettes or not, as may be determined by the design. Fig. 2 represents a patent bracket and look-out combined which is being employed with this work. It is made to receive and support the ends of the cornice with which the ceiling is finished around angles of the room and thus do away with straight or nailed joints. It is of a kind

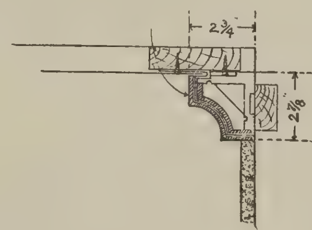


Fig. 3.—Modified Form of Bracket.

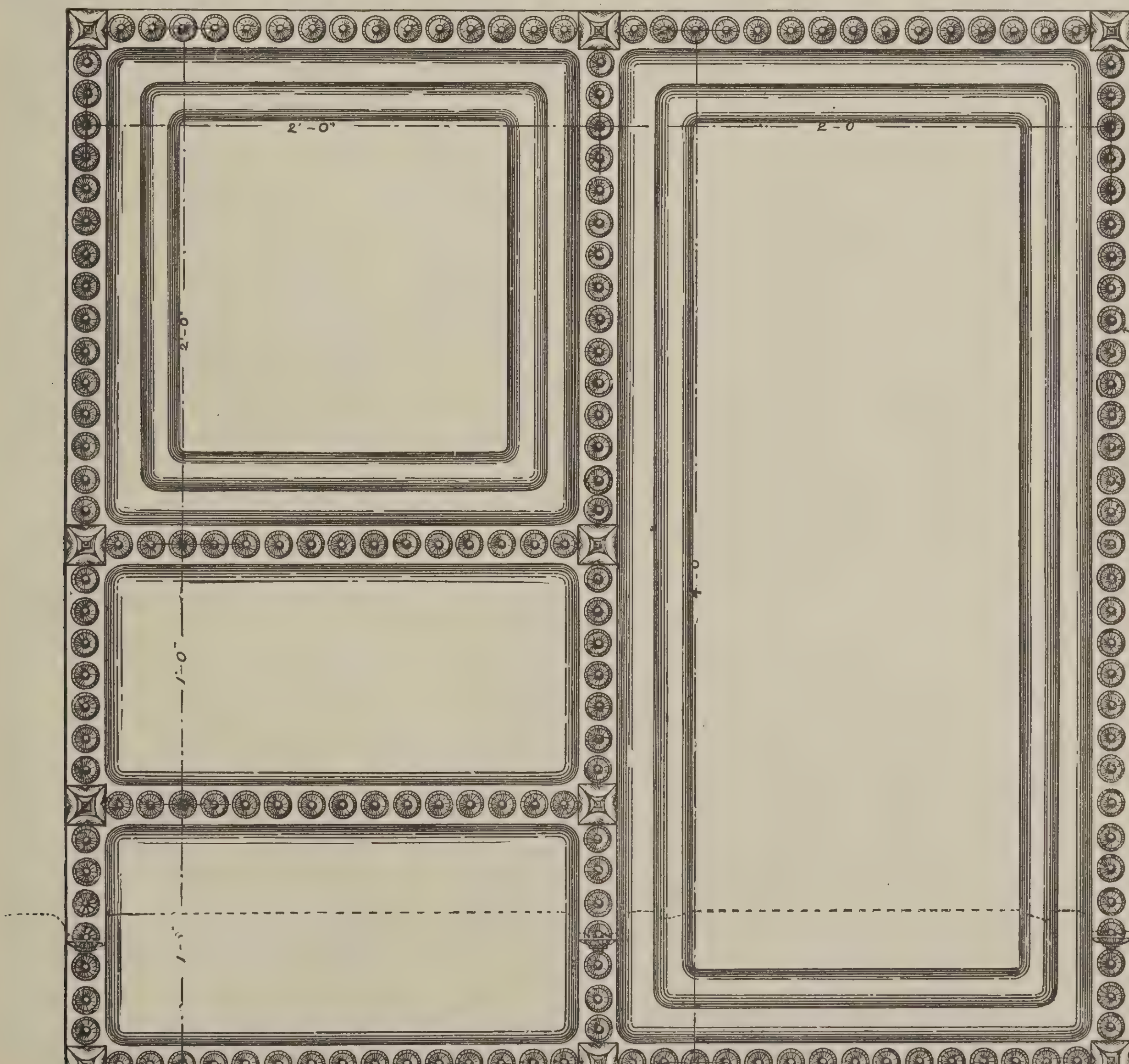


Fig. 1.—Specimens of Panels Used in Kinnear's Sheet-Metal Ceiling.

to be placed at different distances between centers, thus adapting it to different kinds of work. Fig. 3 is a modification of the same idea and shows it in effect in smaller space, being adapted for use with less elaborate cornices. The general scheme of putting this ceiling in place may be briefly described. The idea is to work from the center, filling as much of the ceiling surface as may be desired with panels and then finishing the edge with a plain surface, as indicated in Fig. 2 of the engravings. This surface may be flat, crimped or corrugated, as may be preferred, according to the features of the general design, and is of any width that may be necessary to fill the space that is left.

It is a matter of wonder that so important an element in cornice and ceiling work as a panel has not been struck up in single pieces before. It does not need a prophet to declare that the mitered joints and tinkered work generally which go into construction of this kind are an abomination. Particularly is this so in the eyes of architects and the more intelligent of the builders of the country, and, accordingly, what Mr. Kinnear has done in this case would seem to be likely to meet general appreciation on this account alone. In addition, the ceiling has sterling merits of its own. Stamped panels of the general kind which are employed in the ceiling here shown are equally applicable in cornices, and we look forward to the day when much of the work that is now done laboriously by hand in cornices, &c., for the exterior decoration of buildings will be struck up somewhat in the general manner indicated here.

The firm inform us that they are using soft sheet steel for their ceiling work. The panels thus made, some of which we have examined, are elegant specimens of sheet metal construction. The ceiling produced by their use is light and strong, free from buckle and warp, and is so put together that expansion and contraction are fully provided for. The firm mention that the surface is smooth and flat and is adapted to be painted or decorated at will. The joints are thoroughly concealed. The work is of a character to be put on over old plaster or wood ceilings, and in new work may be put up against wood supports or used as a finish under iron beams, brick arches and the like. The catalogue which the firm have issued, and to which reference is made above, contains, in addition to designs, a number of very flattering testimonials from architects under whose supervision some of this work has been used.

NEW PUBLICATIONS.

AMERICAN GLOSSARY OF ARCHITECTURAL TERMS. Small quarto; half cloth binding; illustrated. Frontispiece portrait of the author, George O. Garnsey.

Some time since we reviewed the first edition of the work described above. Quite recently a new edition has been published, the principal addition to it being the portrait of the author above mentioned, and a generous selection of advertisements placed at the front and back of the book. We understand that the present edition is for free distribution. Application for the same should be addressed to George O. Garnsey, architect, Chicago, Ill.

USES OF BELTING. By John H. Cooper. Illustrated. Size, 6 x 9½ inches. 399 pages. Published by Edward Meeks. Price, $3.50.

As Mr. Cooper's book has reached its third edition we need not consider it as an entire stranger, its general character being no doubt familiar to a large number of readers. The principal feature of the new issue consists in the addition of several foreign articles on belting, and extensive reference to contributions which have been made to engineering societies, the collection of practical data from different sources also having been enlarged. It may be well to briefly repeat here that the book is virtually a compilation of facts and figures, a circumstance which is apparent at a glance, the author himself having in the main performed simply the work of editing the several parts and properly classifying them. Mr. Cooper, in fact, explains that his work, arising originally from a desire to know about belting for shop use, has been that of collecting, condensing and comparing existing published data and rules. To these have been added examples of belts in use, with the object of showing how closely their performance corresponds to the rules which are given for such cases. The reader must, however, be prepared to find considerable divergencies in the results which are given by following several formula supposed to yield practically identical figures. Those who have endeavored to secure a convenient formula for belt powers and widths under known conditions by consulting different authorities have, we believe, invariably encountered these amazing discrepancies, and Mr. Cooper's book, for obvious reasons, can prove no exception. But the information which it contains is nevertheless of much value, presenting, at least, data derived from cases in practice.

STEAM HEATING. An Exposition of the American Practice of Warming Buildings by Steam. By Robert Briggs, M. I., C. E. 122 pages. Size 4 x 6 inches. Published by D. Van Nostrand. Price 50 cents.

The valuable little book before us is numbered 68 in the Van Nostrand Scientific Series, and this much description will, in a general way, inform our readers what the volume is like so far as appearance is concerned. The part by Mr. Briggs occupies 70 pages of the book, the remainder, or addendum, being written by Alfred R. Wolff, M. E., and contains some empirical data on steam heating. The steam-heating portion is reprinted from the "Proceedings of the Institute of Civil Engineers," and was prepared, presumably, for the purpose of informing English readers concerning the practice of steam heating in this country. The article opens with a brief historical review of the practice, after which some 20 odd pages are devoted to wrought-iron welded tubes and couplings, the subject being fully treated with the aid of tables and formulæ. The subject of boilers is very briefly noticed and treated only in a general way. The theory of the circulation of steam follows, and some remarks are added on the clothing of steam mains. Steam stop valves are illustrated and described and the remainder of Mr. Brigg's work is devoted to radiators, their use and construction. The appendix by Mr. Wolff contains data in the shape of tables and formulæ that will prove of special interest to those who investigate the subject of steam heating from a theoretical standpoint and who are not afraid to handle mathematics. A table at the end giving chimney and boiler proportions, which was prepared by Mr. William Kent, possesses considerable value for those who do large steam-heating jobs.

Contractors' Estimates.

We are indebted to I. N. Phillips, of Nashville, Tenn., for a copy of the rules under which estimates will be submitted by contractors in the building trades in Nashville for the future. They are of interest to sub-contractors in general all over the country as showing what can be done by co-operative action. We submit them to our readers for their consideration:

1. General drawings, when offered for final or competitive estimates, should be presented on a scale not less than ⅛ inch to the foot, and details not less than ¾ inch to the foot. These should be done in ink or by some process that will not fade or obliterate, and be complete in all parts. Specifications should also be presented in ink.

2. The specifications, figured drawings and details should be taken as the guide for estimating, and all demands made by the specifications or said drawings should be covered in the estimates offered, unless objection be made thereto in writing when the estimate is submitted.

3. Specifications should be plain and definite, and everything required in the various branches of work should be mentioned, described and grouped under appropriate headings—each trade to itself.

4. When the specifications require goods of a certain manufacturer, or material of a certain quality, the name and catalogue number of such manufacturer's goods, and the trade-mark of such material should be mentioned in the section to which such goods or materials belong.

5. Bills of quantities should be left to the intelligence of the contractor, and shall not be required of the architect.

6. Contractors should be responsible to each other for work damaged during the erection of the building.

7. When the contractor for the whole is to be restricted as to whom he shall employ as sub-contractors, that fact should be named in the specifications.

8. Contracts should be closed at some stated time, and no estimates should be considered if received after that time has expired.

9. Contracts should be awarded within ten days from the time of closing estimates.

10. Architects should invite to bid on the work only those from whom they desire an estimate on that particular job.

11. All bids received from those not invited should be excluded.

12. No contractor should make an estimate in an architect's office unless invited to do so.

13. When a contract involves the taking down or using the material of an old building, it should be fully set forth in the specifications.

14. No bid should be exhibited or made known by either architect, owner or principal contractor before the time for closing estimates on the job.

15. No contractor should be allowed to alter or amend his bid after the time of closing estimates.

16. Contractors should decline to give estimates in the aggregate when bids are being received under the separate heads. Sub-contractors should also decline to give the architect or owner an estimate for his branch of the work, when bids are being received for the work as a whole.

17. When the contract is to be completed within a certain time that fact should be mentioned in the specifications, giving the date; and if a penalty for non-completion by the specified time is to be exacted, it should be so stated.

18. The bidder to whom a contract is awarded should be required to sign a contract and furnish bond or withdraw his estimate.

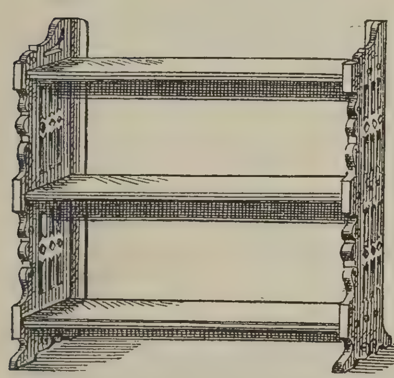
19. The principal contractor should pay the sub-contractor in the same manner that the sub-contractor receives his estimates from the architect, when the work is let separately—to-wit: 75 per cent. as his work progresses, and a final payment when his branch of the work is completed satisfactorily.

THE MELBOURNE EXPOSITION, which was opened Aug. 1, will commemorate the founding of European settlements at the antipodes. The building is a grand structure 1240 feet long and 1000 feet wide, comprising,

with its temporary annexes, more than 1,000,000 square feet. The area according to divisions is as follows: Space available for outside exhibits, 8½ acres; area of main buildings, machinery and temporary annexes, 23¼ acres; total area of gardens, 12 acres; Carlton gardens, 19¼ acres. Total, 63 acres.

Small Book-Cases and Cabinets.

A hanging book-shelf or a cabinet is a most useful article for a bedroom. The cabinet may be employed for bric-a-brac, for the storage of small articles of wearing apparel or for the toilet, or it may be used as a medicine cupboard. Whatever may be its use, such articles are in constant demand, and many carpenters have the opportunity of fitting up something of this kind to sell, or for the embellishment of rooms in their own dwellings. Low-down book-shelves, to set down upon the floor, are also in demand. There is comparatively small room for variation in design among these articles, and yet something can be done to lend a pleasing variety to them. In many instances the same set of book-shelves may be used at pleasure, either on the floor or fastened against the wall. We present herewith some designs for book-shelves and also for cabinets, which, we have reason to think, would be an acceptable addition to the stock of designs in work of this sort by our readers. Fig. 1 represents a very cheap kind of a book-shelf, having an open back with fret-cut ends. Fig. 2 is a slight advance over the work shown in Fig. 1, inasmuch as it has a beveled back and also a carved pediment. Instead of the ends being fret-cut, as in the first instance, they are incised or carved. Figs. 5, 6 and 7 contain suggestions of ends for book-shelves of the two kinds above illustrated. Fig. 5 is intended to be fret-cut, with a piece of diamond-shaped, carved work in the center. The ends of Fig. 6 might be enriched with incising. In the front a turn-spindle is shown between the top and bottom shelves. The fret-work of Fig. 7 is effective, although unpretentious. Small book-shelves are made, as a rule, only 6 inches deep. This is too narrow to be useful, and we suggest to our readers that for general purposes the shelves should be not less than 8 inches. Fig. 3 shows a cabinet of simple character and something that can be made up cheaply by any mechanic. Carved flutes are indicated at both sides of the fret-work rim at the back, and the doors are shown with beveled panels. Beveled mirrors for the center of the doors would add to the character of this design. Their use, however, should depend, in some measure, upon the general finish of the article, the kind of wood employed and other similar conditions. Fig. 4 shows a cabinet more elaborate in design than the preceding. The spindles in the back should be light and should be placed somewhat closely together. Each door is shown with four beveled panels. The design might be varied by making single panels or double panels instead. The suggestion of paneled mirrors, made with reference to the preceding design, is also applicable in this case. Either of the designs here shown, whether of book-cases or cabinets, might be made of mahogany, ash, oak or of other woods to match the other articles of furniture in the room in which it is to be used.



Cheap Book Shelves.—Fig. 1.—Open Back and Fret-Cut Ends.

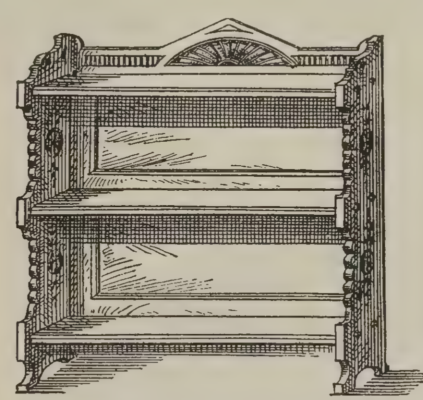


Fig. 2.—Paneled Back with Carved Ends.

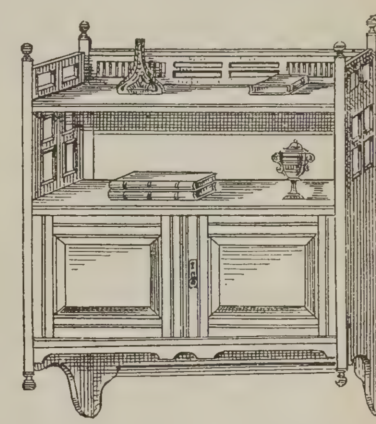


Fig. 3.—Cabinet with Book Shelf Above.

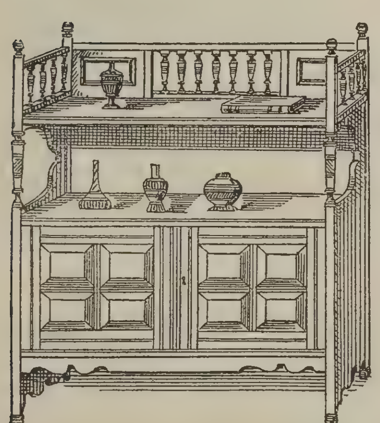
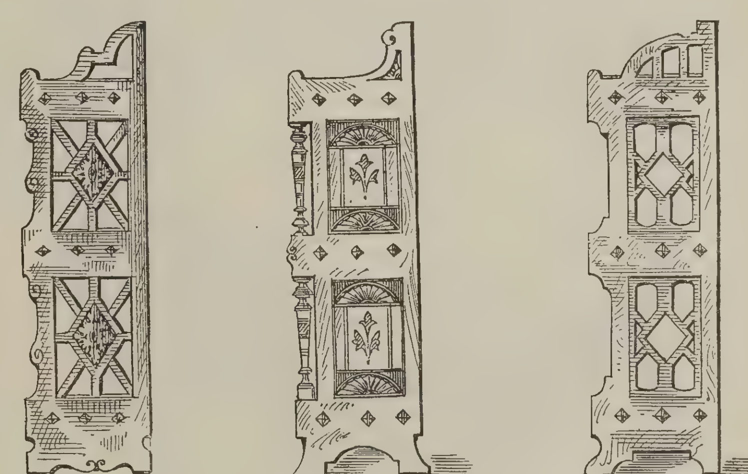


Fig. 4.—Cabinet with Panel Doors.



Figs. 5, 6 and 7.—Suggestions for Ends of Book Shelves.

SMALL BOOK CASES AND CABINETS.

Ancient and Modern Work.

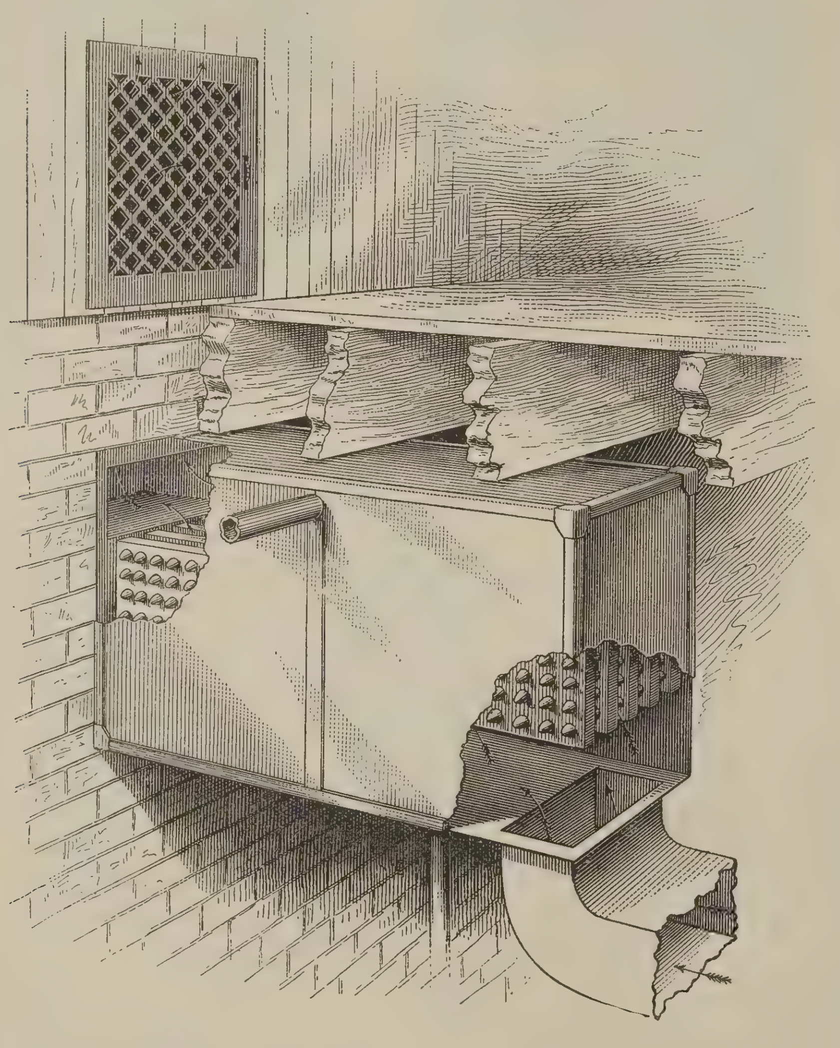
A comparison of the notable works of ancient and modern times is always interesting. In making comparisons, however, it is necessary to bear in mind the difference in conditions, as between the people of the nations of the present age of the world and those of former periods. R. Chambers, writing upon this point, says:

The vast buildings of ancient nations speak very startlingly for their great social energies. But we must not be overwhelmed by the descriptions of their cities, pyramids and temples. Babylon is described as a quadrangle of 15 miles on each side. If so it must have contained 225 square miles. Upon the dubious authority from which we derive the description of Babylon, it is totally incredible that any natio of antiquity, in a part of the earth by no means fertile, should have had a metropolitan city of the same character as our modern cities in respect of buildings, and so many times larger than London. Either the space must have been chiefly composed of gardens and fields, or it must have been of less ample dimensions. As for the splendid edifices of Thebes and Palmyra, they were nothing which might not again be if a people chose to spend their energies in the same way. The docks of Liverpool probably contain much more masonry than the Pyramids; they have the further merit—which the Pyramids never had—of being extremely useful to mankind, a usefulness acknowledged by the revenue. In the canals and railways of Western Europe and America we have works of much greater labor and cost, though less ostentatious than any

public works of any kind produced in the days of antiquity. The five roads of Napoleon across the Alps have been calculated to involve equal labor to the Pyramids; yet there must be many persons of no limited intelligence who scarcely know that such things exist. But the question remains, What do the public structures of antiquity, allowing them to be wonderfully great, say for the moral and social condition of the ancient nations? With scarcely an exception, they appear to have been without a useful aim. The Pyramids were built by an enslaved people for the glorification of despots. The solemn temples, whose pillars whiten the desert, are but monuments of dismal superstitions. While the devotion to royal authority and to superstition reared such vast structures, the people had only hovels for their ordinary residences; their food was wretched, and all their comforts upon the most limited scale. In fact, that the ancients should have spent their energies in building only temples and mausolea is a fitter subject for pity than for praise. They have thus betrayed the wretched ignorance, slavery and misery in which they lived.

Casing for Indirect Radiators.

Those of our readers who have had experience in fitting up the casings of indirect radiators, or who in putting up radiators have been obliged to wait for the sheet-metal workers to prepare the casing, or, on the other hand, to take an extreme illustration, who have had occasion to tear a casing apart in order to get at the radiators for alteration or repairs, are in position to appreciate an improvement in casings patented a short time since by Mr. A. Rasner, and which is being manufactured by Rasner & Dinger, corner First avenue and Market street, Pittsburgh, Pa. Illustrations of this construction are presented on this page. The general scheme is to provide a radiator box so constructed as to be shipped and handled in pieces and to be put in place under any and all circumstances, and also to be readily removable without damage, if for any purpose removal or change is necessary. Neither rivets, bolts, nor solder are used in the construction here shown, and yet the box is practically air-tight and has the special advantages above described. A peculiar corner or angle piece is employed which, in combination with edges turned back on the side and end pieces, produces a joint of the general character illustrated in Fig. 2 of the engravings. By this means the sheets are firmly attached to each other at the corners and are securely held in position. Just how the corners works out is better shown in Fig. 3, where one of the angle strips is shown pulled back. In order to make a finish at this point, a cap piece--an interior view of which is shown in Fig. 4—is employed. This is struck up in a form to fit over the corner, as indicated in Fig. 5, with an edge tucked down against each adjacent face of the box, as shown in the engraving. The corner piece is held in place by two prongs or cleats, which are fastened on the inside, and which, in putting in place, are forced into the folds of the angle strip shown in profile in Fig. 2. The tuck of the corner piece, the fit of which is indicated in Fig. 5, is not so great but that it may be readily sprung in place, and as easily sprung off when it is necessary to remove the corner. The position of the prongs extending into the corner seams is indicated by the dotted lines at the right in Fig. 5. In the construction of radiator boxes for the purpose named, it is sometimes necessary to make the sides in two or more pieces, either on account of length, or for the purpose of fitting around a pipe. An illustration of this is shown on the side in the foreground in Fig. 1. Where a joint is to be made between two abutting sheets in this manner, a jointing strip of the profile shown in Fig 6 is employed. This makes a very satisfactory seam that is neat in appearance and adds rigidity to the work, and at the same time does not interfere in the least in construction with other particulars. Occasionally it is difficult on account of the location to put a box of this kind in position, and slip on the corner pieces that we have already described on the upper angles. Various modifications, therefore, suggest themselves, one of which is shown in Figs. 7 and 8. In this case the top sheet or cover of the box is first put in place under the joists, and to it the sides are hooked, as shown in profile in Fig. 7, and in perspective in Fig. 8. In other respects the box would be constructed in the same manner as already indicated. This construction, which, as we have mentioned, was patented a short time since, has been in use for some time past by the firm above mentioned in



Casing for Indirect Radiators.—Fig. 1.—General View of Casing in Position as Supplied by Rasner & Dinger, Pittsburgh.

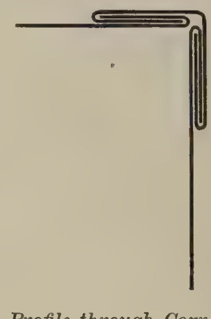


Fig. 2.—Profile through Corner Joints.

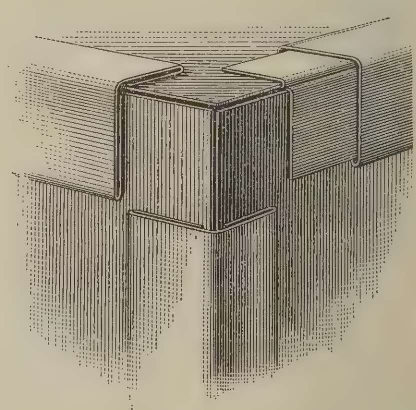


Fig. 3.—Perspective View of Corner, Showing One of the Angle Strips Slipped Back a Short Distance.

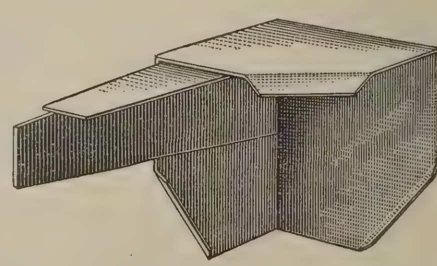


Fig. 4.—Inside Perspective View of Corner Cap.

both public and private contracts, and, we are informed, has given very general satisfaction. The special points which recommend it for use embody those already mentioned, with the additional one, that where the tinsmith is supplied with proper machinery for making boxes of this kind, they are produced quite as cheaply as the

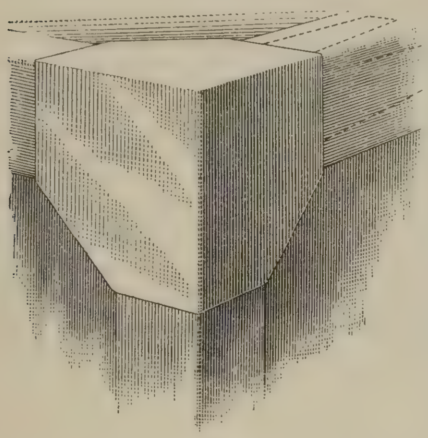


Fig. 5.—Perspective View, Showing Corner Cap in Position.

ordinary riveted and soldered box; while on the other hand, in matter of transportation, a knock-down box can certainly be sent at much smaller cost than one that is made complete. The ability to take out a side or end of a box on demand, for the purpose of examining or fixing anything in the inside, is greatly appreciated by steam-fitters. It permits the tinner to finish his work on a large contract, and leave for home, even though steam has not yet been let on for the test. The whole construction, we are informed, has had the indorsement of a number of prominent architects, to whose attention it has been brought.

Fires from Steam Pipes.

The second annual report of the fire marshal of the City of Boston, for the year ending May 1, 1888, contains, among other matters, the following interesting information:

I have been able to satisfactorily trace the origin of but five fires during the

Fig. 6.—Profile of Joining Strip.

year to steam-pipes, and the circumstances surrounding these in no way tend to show that wood, in its normal condition—*i. e.*, when free from any previous desiccation, is in danger of becoming ignited in this manner. In other words, ignition in said cases appears to be merely a certain species of what is popularly termed "spontaneous combustion," the steam-pipes themselves being merely one of many indirect factors which often assist in producing such combustion. Although the subject has been discussed pro and con from the year 1846, when Chief Braidwood, of the London Fire Brigade, first addressed the House of Lords on the topic, to the present time, when the opinions of experienced persons interested in the matter seem to be somewhat conflicting, I find by far the preponderance of evidence in favor of the conclusion that wood, subjected for a number of years to the heat of steam-pipes, may eventually reach such a state of carbonization as, with the addition of moisture, exposure to a draft of air, or under the influence of friction, caused by expansion and contraction of the pipes, may break into flame. As the ignition point of ordinary pine wood has been determined, by experiment, to be 700° F., it is evident that this must be reduced by some process, in order to admit of its taking fire at 292°, the temperature of steam under a pressure of 60 pounds.

I have found one of the most frequent causes of fires, which are indirectly traceable to steam-pipes, to be the self-ignition of dust, fluff, small pieces of paper, waste, &c., which seem especially attracted to the neighborhood of inclosed steam-pipes through almost imperceptible crevices. In several such instances the fires have been fortunately discovered and extinguished before doing any harm. P. A. Montgomery, secretary of the Western Manufacturers' Mutual Insurance Company, in special report No. 5 of the Manufacturers' Mutual Insurance Company refers to this same element of danger and suggests, as a remedy, the use of a funnel-shaped casting, cast in two parts, from 3 to 6 inches in hight, fitting close at the top, and screwed to the floor, where the pipe passes through; and he further recommends that a thimble of some non-com-

Fig. 7.—Profile of Alternative Construction for Top of Box.

bustible material should be put through the hole in the floor or partition and securely fastened on either side, in order to protect the wood from contact with the pipe.

The light sheathing by which the pipes are often covered, being obliged to constantly absorb the confined steam heat, is extremely liable to reach a dangerous ignition temperature. Sheathing reduced to such condition by being in close contact with the pipe, and so placed as to be susceptible to more or less friction caused one of the five fires herein referred to; another was caused by lumber dust in the dry-house of a planing mill sifting through the floor on to the pipes. The desirability of employing some sort of non-combustible covering for steam-pipes, to prevent their contact with wood, dust, &c., is apparent. They should never be inclosed in wood sheathing. Professor Gibson, in a report to the Manufacturers' Mutual Iusurance Company, gives an exhaustive and instructive treatise

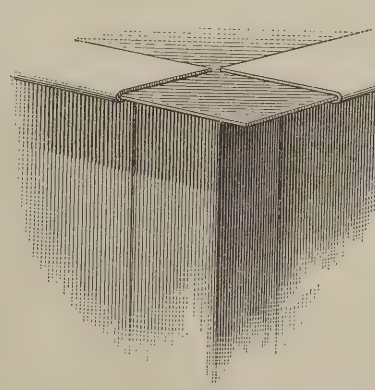


Fig. 8.—Perspective View, Showing Alternative Construction.

on the merits of the various kinds of coverings.

Another danger from steam-pipes is the favor with which they are apparently looked upon as offering a desirable neighborhood for the location of rats' nests, in which the phosphorous matches and bits of waste often found therein are in danger of becoming impregnated with the necessary amount of heat essential to the production of spontaneous combustion.

BRICKLAYING.

Brickwork and Bricklaying.—III.

BY ARTHUR SEYMOUR JENNINGS.

(Continued from page 121, June number).

We have already described at some length the manner in which running bond is commonly executed. We now propose showing the manner of building in English bond and afterward of pointing out the essential differences between the two. In the appearance of the face English bond is unlike that of any other. Briefly it may be described as consisting of the bricks being laid in courses which are alternately headers and stretchers, while the whole of the bricks in the interior are laid headers. Taking a wall equal in thickness to the length of two bricks, as shown in Fig. 1, as an example, the construction will be clear. The bricklayer proceeds as follows: Having marked out the length and width of the wall he commences at one corner and first lays a brick a header; then he follows on with a closer, which is a half brick split longitudinally. He then follows on with headers for some 2 or 3 feet. Each brick is carefully placed in position, the mortar being thrown around it and trued up as the work proceeds. The corner brick, which is a header on one elevation, of course will be a stretcher on the other, and before proceeding with the 2 or 3 feet of brickwork already constructed the bricklayer follows on the return side with stretchers both on the inside and outside of the wall, placing headers between them. A closer is also placed at the angle on the inside in order to bring the headers in front course in line. This will be clear on reference to Fig. 1, where the closers are marked C. Having completed this course for some 3 feet the operator now commences in a similar manner at the opposite corner of the building, and he then works alternately from each end in lengths of about 3 feet until the middle of the wall is reached and the brickwork joins. The object of this is to thown any broken bond (that is, pieces of brick necessitated by the length of the wall) into the middle of the wall, so that it may not be so conspicuous. The first course having been completed in this manner the second is laid upon it in the same way, only that the position of the bricks is reversed—that is, the header is laid where a stretcher was on the course below, and *vice versa.* In this way the wall is brought up sometimes in lengths of 2 to 3 feet in four or five courses at a time. The setting out of the first course by itself is to determine the position of the bricks to come over them, and the greatest care is taken in the best brickwork that all headers showing on the face shall come exactly in the center of the stretchers immediately above and below them. Testing with the plumb-bob and levels is done frequently, not only at all the angles, but also to insure the purpends being kept true—that is, that vertical lines of alternate courses shall be kept perpendicularly over one another.

Practically, the construction of all walls in English bond is carried out on the same principles as that of the wall described. Examples are given, in Figs. 2 and 3, of walls of one and one and one-half bricks in thickness respectively, "broken bond" being shown in Fig. 2 at *b*. Where the thickness exceeds that of two bricks the construction may be readily determined

by remembering that all bricks in the interior of the wall are laid headers, proper closers being inserted at the quoins as required.

Having suggested so radical a change in the construction of brickwork in this country, it is advisable that my reason for doing so should be clearly explained. Let it be first asked, Why are not bricks piled indiscriminately upon one another, without any regard to arrangement, so long as the wall resulting is plumb? Any bricklayer will have no difficulty in giving an answer. It is necessary that bond be obtained, and by bond he means that the bricks should be lapped, in order to tie the wall which they compose together. Imagine the result of arranging a number of bricks exactly over one another. Apart from the question of appearance, it will be seen that the strength of a wall so composed would be wholly dependent upon the mortar, rather than the bricks. It would, in fact, consist of a number of little piers half a brick thick and one brick wide. Let us suppose that such a wall is to support one Fig. 4 is, of a number of small piers built side by side, then the whole of the load thrown upon the wall is carried by the inside wall, and there is but little doubt that the remaining portion of it would be to a great extent useless. Running bond, however, is fortunately not quite so bad as the example we have given. Some attempt is made to bind the inside and outside sections of the wall together. The headers which are introduced in every sixth or seventh course effect this to some extent, but it is maintained that in view of the extreme advisability of making the best possible connection between the inside and outside of the wall, headers should be introduced as far as possible, and that to build them only at the interval of every sixth course is wholly inadequate. Granting the necessity of lapping the bricks in both directions, the result will be bound to show itself in this important fact—that no two vertical joints will ever be over one another, and it may be stated broadly that where this condition is fulfilled the bonding is practically perfect. It is suggested are skipped. It is not uncommon to meet cases even in running bond, where even part of the sixth course headers are omitted, and, of course, the same is equally the fact in carrying out English bond. But, in the latter case, by the abundance of headers used, the omission is not of serious moment.

The mere fact of running bond being almost universally employed in America would argue somewhat in its favor. It certainly has its advantage, and it is this: It can be carried out probably quicker than any other form of bond. But when it is considered how inferior in strength the wall is, it will be obvious that the saving of time is very poor economy. English bond, too, has its objections. It is heavy in appearance, and, although undoubtedly the best for all heavy works which are hidden from view —for example, all interior walls—it is frequently objected to for face work. The form of bond known as "Flemish," which is certainly stronger than running bond, and which is probably even neater in ad

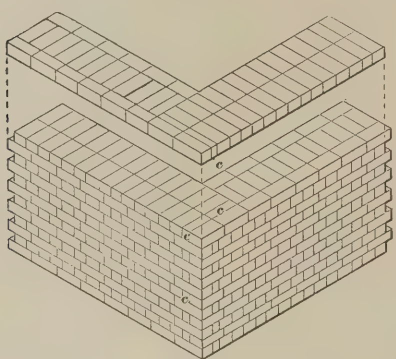


Fig. 1.—A Two-Brick Wall in English Bond.

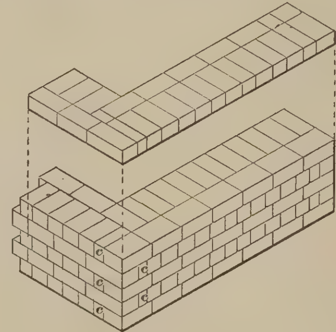


Fig. 3.—A Brick and a Half Wall in English Bond.

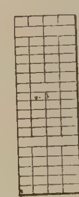


Fig. 5.—Section Through Running Bond.

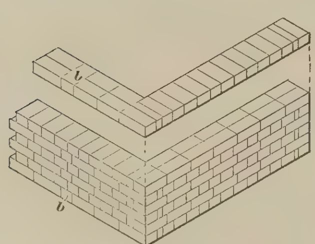


Fig. 2.—A One-Brick Wall in English Bond.

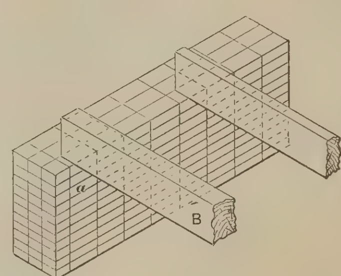


Fig. 4.—Diagram Illustrating the Necessity of Lapping Brick.

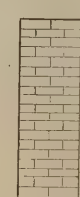


Fig. 6.—Section through English Bond.

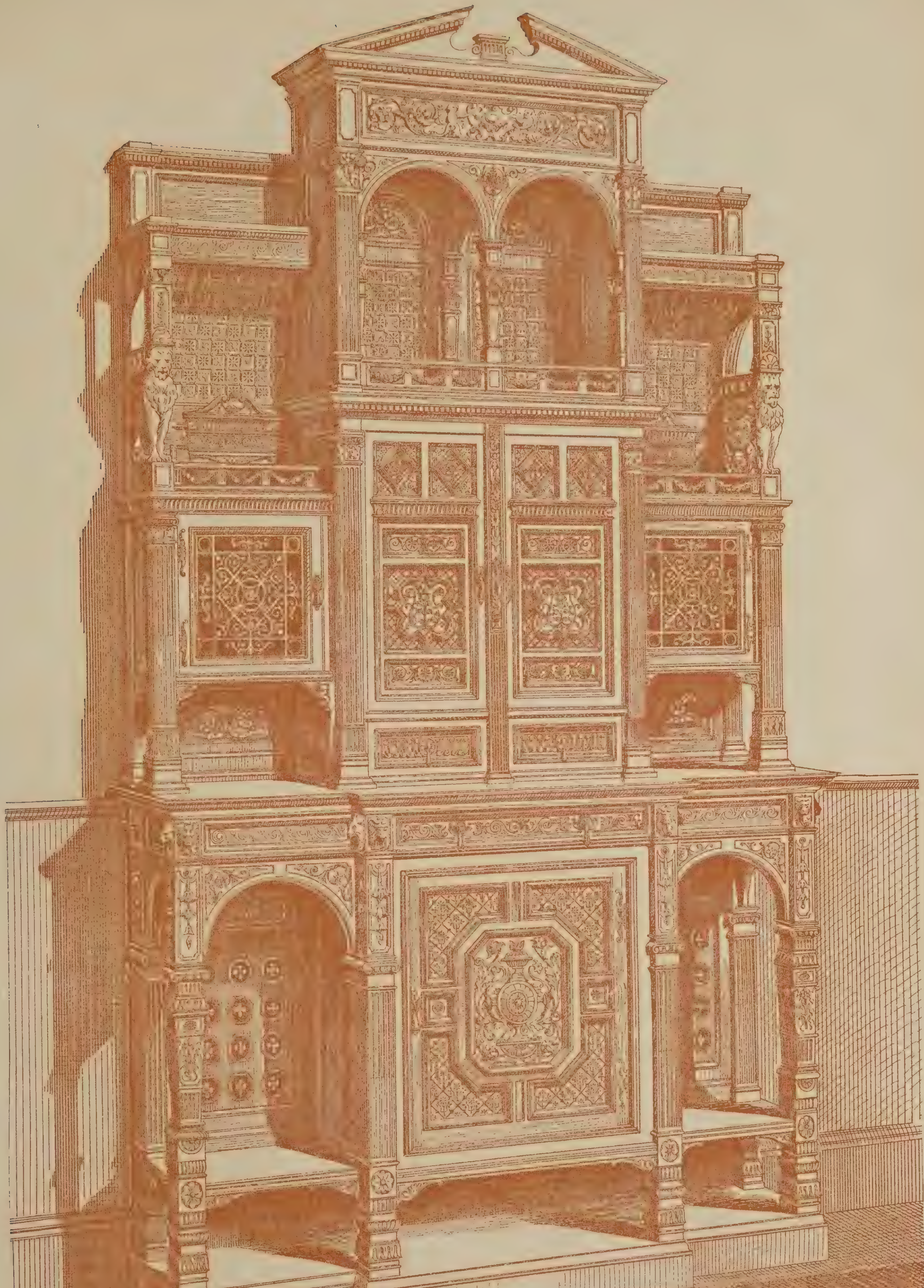
ILLUSTRATIONS ACCOMPANYING ARTICLE III ON BRICKWORK AND BRICKLAYING.

end of a heavy girder, as shown at B in Fig. 4. It will not be difficult to understand that the weight will be carried entirely by the column of bricks immediately beneath it and marked *a*. The result would be that the mortar would crack and the girder would probably come to the ground. Now, if the bricks be arranged so that they lap over one another, no such separation of parts can result, and the weight, whatever it may be, is distributed, to some extent, over the length of the wall. So far it has been shown that there is a necessity of lapping the bricks. The question is whether it is equally necessary to lap through the thickness of the wall, as it is in its length. That we may be able to determine this, let us consider the nature of the weight which is carried by most walls. In ninety-nine out of a hundred cases it consists of the load thrown upon it by the floor and roof timbers. Now, these timbers always rest on the edge of the inside of the wall, and even if they have a wide bearing the greater part of the weight is thrown on the inside by reason of the sagging or bending of the timbers. If the wall is composed as that shown in that the reader who is interested in this subject should make for himself some models of bricks, and, having in view the object to be effected, arrange them in different ways. There will be, of course, no mortar here, and the merits of each of the two systems of building, running bond and English bond, will soon be apparent.

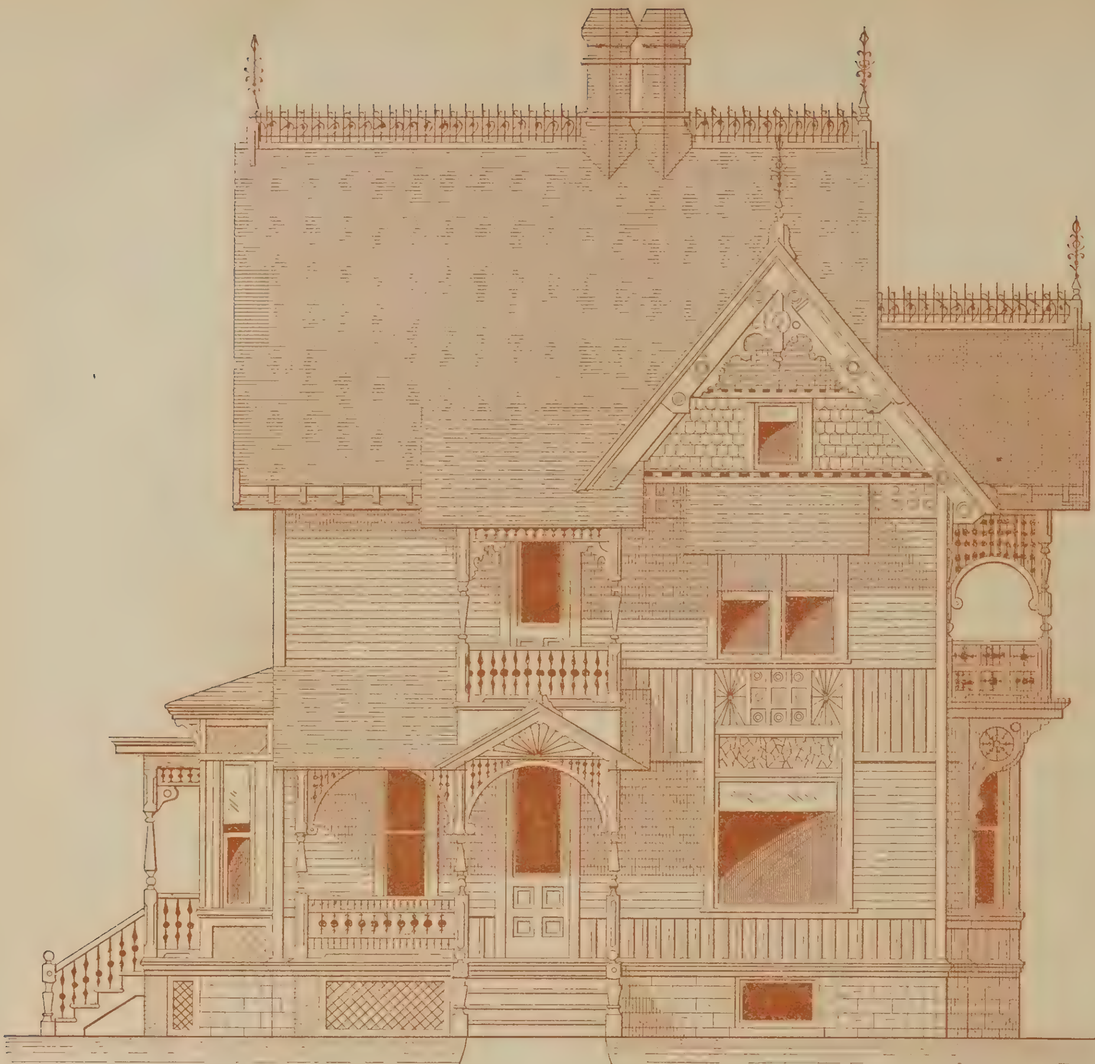
When two vertical joints do come over one another, may always be shown by a vertical section through the wall at that point. In Fig. 5 is shown a vertical section through a two-brick wall in running bond, and in Fig. 6 a similar section through the wall in English bond. Considering that such sections answer for any part of either wall, it does not seem difficult to appreciate the fact as to which is the stronger. Of course, in actual construction, a number of bats and pieces of bricks are of necessity employed. This must always, to some extent, weaken the wall, and they certainly do so to a greater extent where there are plenty of headers employed than where only so few are inserted. The practical man, familiar with the operations of the bricklayer, will know how often headers pearance, is one used most extensively in England, and will be referred to at length in our next paper.

(To be continued.)

A METALLIC FACING for walls of buildings, by which the surface is made to resemble cut stonework, is the subject of a patent granted to A. M. Hansen, of Fulton, Ill., a short time since. The grooves representing joints between stone-work are stamped or otherwise formed upon the outer faces of the sheets, thus producing extended projections on the inner sides of the sheets. These projections form bearings against and hold the plain portions of the sheet away from the walls sufficiently to form air spaces between the walls and the metallic facings, for the purpose of protecting the building from dampness, from cold in winter and heat in summer, and also from external fires. The inventor points out in his specification that the appearance of the building may be varied by painting it with different colors.

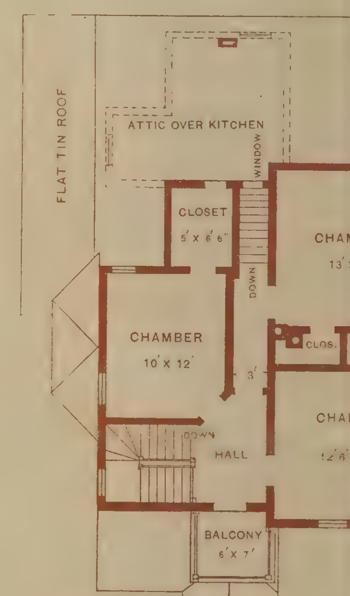


ITALIAN RENAISSANCE CABINET. DESIGNED BY C. TRAPNELL.



FRONT ELEVATION. Scale, 1-8 Inch to the Foot.

FIRST FLOOR PLAN



SECOND FLOOR PLAN. Scale, 1-16 In

RIGHT SIDE ELEVATION. Scale, 1-8 Inch to the Foot.

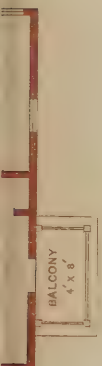
FOUNDATION

Scale, 1-16

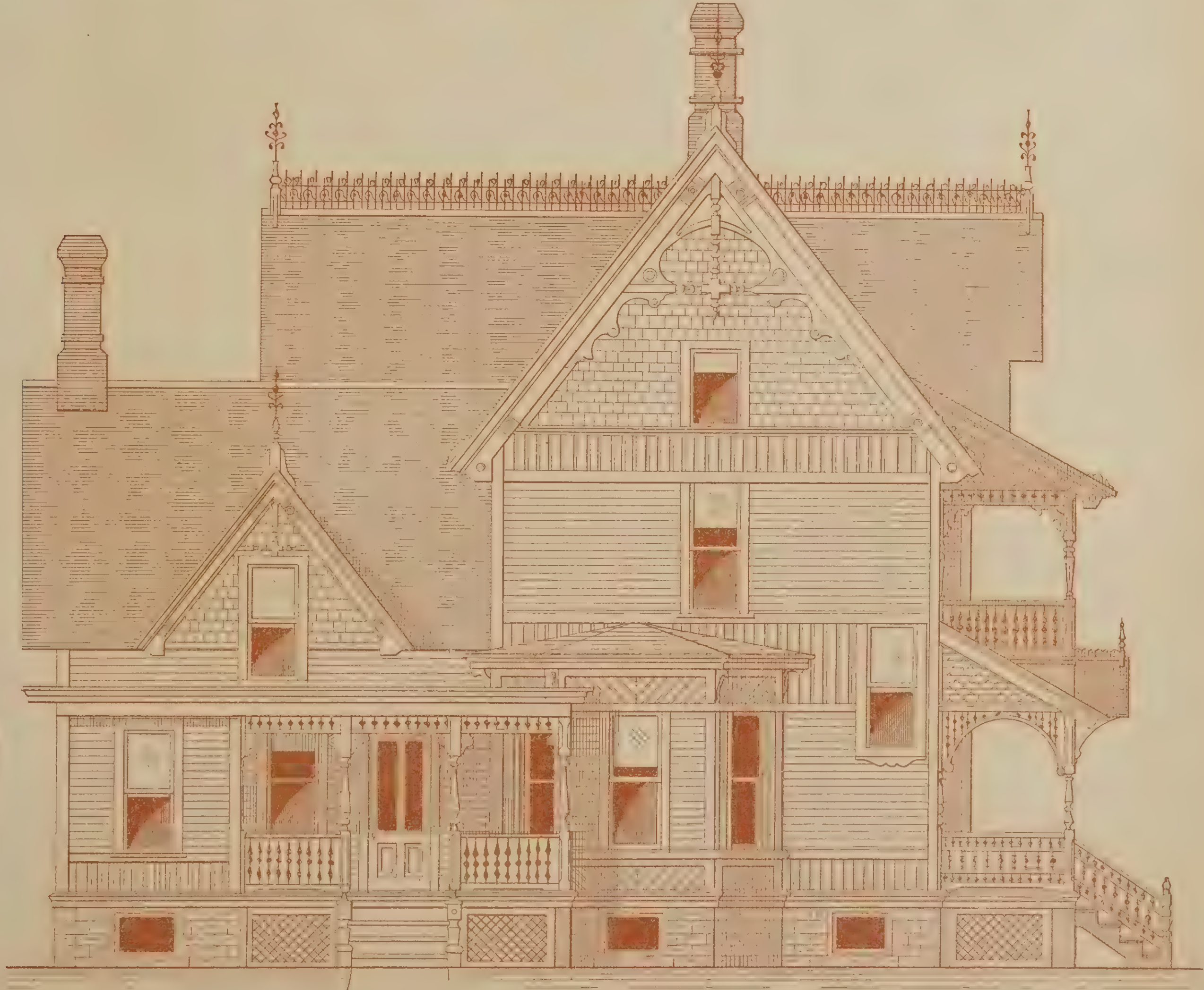
RESIDENCE OF W. G. EARLE, DESIGNED B

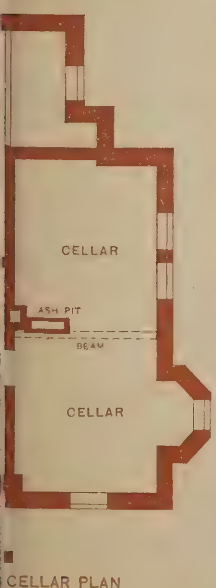
cale, 1-16 Inch to the Foot.

PERSPECTIVE VIEW.



the Foot.

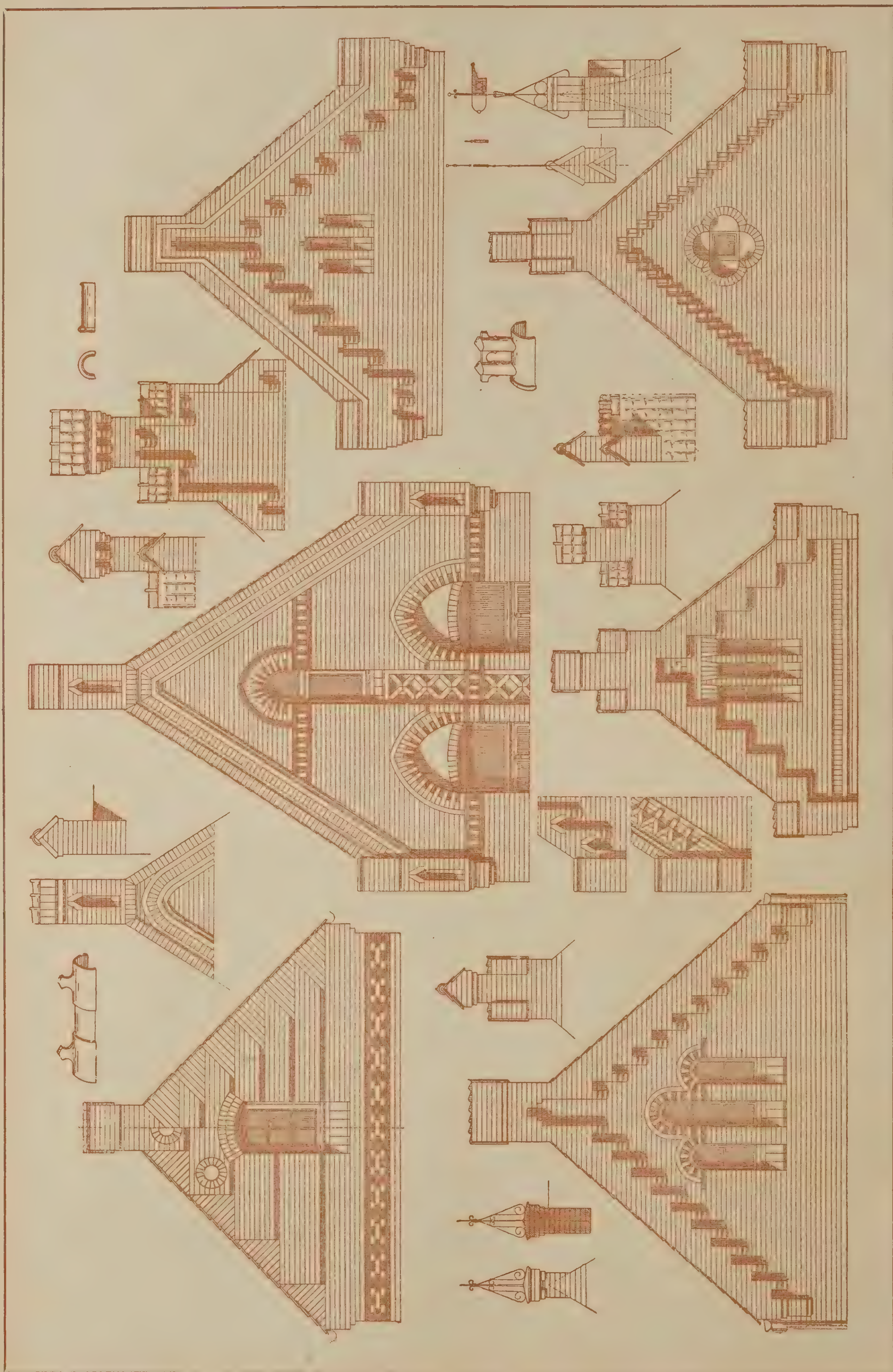




CELLAR PLAN
to the Foot.

LEFT SIDE ELEVATION Scale, 1-8 Inch to the Foot.

GEORGE F. BARBER, ARCHITECT, DEKALB, ILL.

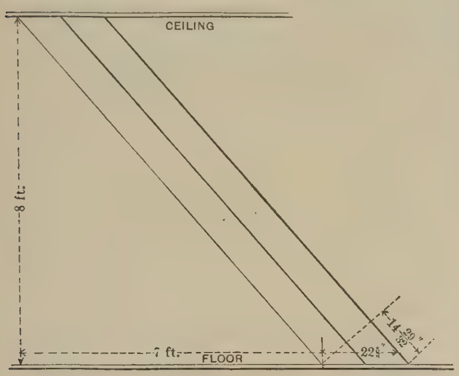


SOME STUDIES IN BRICK GABLES.

CORRESPONDENCE.

Grain-Spout Problem.

From J. G. G., *Mansfield, Ohio.*—In reply to your correspondent "J. H. D.," New Point, Ind., I submit the inclosed diagrams, which illustrate what I think is



Grain Spout Problem.—Fig. 1 of Diagrams by J. G. G.

the simplest way of accomplishing the end which he has in view. First, the base is 7 feet, and the perpendicular is 8 feet. We will assume that the spout is 12 x 12, outside measurement; hence the measurement, which is diagonally through opposite corners, is 17 inches, as represented in Fig. 1 by the dotted lines. We find, further, that the bottom and top cuts would be 7 x 8 inches; therefore, we find the dotted lines running at right angles from the heel with the top corner would strike the same at $14\frac{22}{32}$ from the same point. Therefore, as it is 17 inches diagonally through the spout and 24 inches outside measurements between the same points, we find that our heel cut cannot be same as the diagonal cut; therefore, we are obliged to take one-half of $14\frac{22}{32}$,

Fig. 2 of Diagrams by J. G. G.

which is $7\frac{22}{64}$, and, by setting the bevel to the 12-inch side, the result will be same as shown in Fig. 2. This is to be followed around each way from top to the bottom

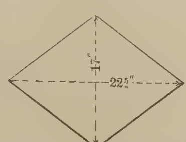


Fig. 3.—Profile of Ends.

on both sides. This will give the cut required and will make a perfect fit at top and bottom. Fig. 3 is a profile of the ends cut ready to place in position. By it we find that instead of the cut being 17 inches diagonally, as it would be if the spout set vertically, it takes the shape shown. The measurements are 17 x $22\frac{5}{8}$.

From A. C., *Columbus, Ohio.*—In answer to the inquiry in the August number of *Carpentry and Building* by your correspondent who talks about grain spouts set diagonally with the room, I offer the following:

In the figures, let R R be the first floor and S S the second floor, and A B C D a section of the spout at its intersection with the first floor, and F G H E the inter section with second floor. Required, the bevels A B and A D. From the point F let fall a plumb-line F K; prolong D A and B A indefinitely. From K draw K L perpendicular to A L, which may be done by squaring over from A L until L K strikes the point K. Draw K N perpendicular to A N. If the work thus far is accurate all the angles in the Figure A L K N will be right angles. Next, join the points F L and F N. A string is a convenient method. Now, F L is perpendicular to A L and F N to A N, as all geometricians will understand. Now, take the distance F L on the blade of your square, L A on the tongue; apply the same as when laying off a common rafter and mark by the tongue for the bevel A B = D C = G F = H E. Next, take F N on the blade, N A on tongue and mark by tongue for bevel A D = B C = E F = H G. To get the length of the spout by

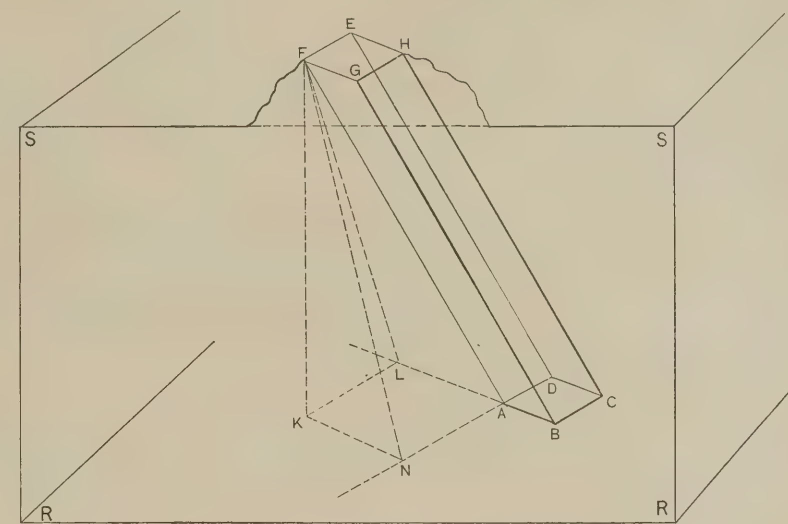


Diagram Accompanying Letter from A. C.

calculation, the square root of the sum of the squares of the distances F K, K L (= N A) and L A (= K N) is the length A F = B G = C H = D E.

From Fred Lascy, *San Francisco.*—The spout problem proposed in your August number, page 171, may be solved thus: The length of spout bottom edge, h, is given by means of its run and rise, which also determine angle W, inclination of h to the horizon. The outside width of each of the four sides of spout equals e. Solution: Make a triangular-shaped paper spout of any length, with two equal sides of any width. This paper spout, bottom edge down, incline at any rake and cut off the ends as nearly level as possible. Next, on a table, place this spout bottom edge up. We now have a paper solid resembling a roof, with hips at one end and valleys at the other end. Of this roof, by supposition: the ridge = h; width of sides = e; inclination to the horizon of the sides = 45°, and of the ends = W. Of this roof, we wish to determine V, the angle between the hips and the long wall plate; which is the angle between the valleys and the ridge, which is the face bevel required to fit the ends of the sloping spout against two horizontal planes.

By inspection of paper roof

$$\text{Tan. } V = \frac{\text{rise } (2)^{\frac{1}{2}}}{\text{run}} = \frac{A\ B,}{A\ V}$$

Terms "run" and "rise" relate to h, the bottom edge of sloping spout. V is the acute angle on face of spout, between any long edge and the adjacent side of end hole which butts against the horizontal plane. There are two such acute angles at each end. Referring to the four-sided sloping spout of the problem, the four acute angled-face marks at each end are all laid off with bevel V and measured from the three longest edges of each end. Considering the outside measure of the diamond-shaped hole at the ends of the four-sided sloping spout, using a scale as large as possible.

By inspection of paper roof,

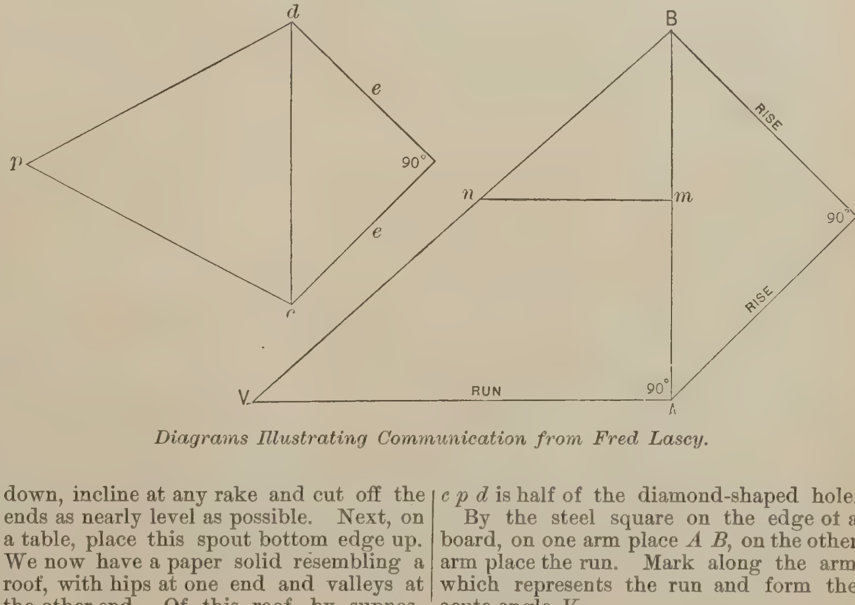
$$\text{Short diameter} = e\ (2)^{\frac{1}{2}} = c\ d.$$

$$\text{Long diameter} = \frac{c\ d.}{\text{sin. } W.}$$

Draw $m\ n$ at a distance, e from $A\ V$.

$$\text{Side of diamond} = V n = \frac{e.}{\text{sin. } V.}$$

Make $p\ c = p\ d = V n$. Then triangle $c\ p\ d$ is half of the diamond-shaped hole.



Diagrams Illustrating Communication from Fred Lascy.

By the steel square on the edge of a board, on one arm place $A\ B$, on the other arm place the run. Mark along the arm which represents the run and form the acute angle V.

From W. F., *Beaumont, Tex.*—Referring to the grain spout, about which "J. H. D." inquires in the August number of *Carpentry and Building*, I would say that if he will build his grain spout, say 13 feet long, and build both ends square, and after letting it down on its side take his square, with the tongue in the right hand and the blade in the left, and standing at the end so that the spout will be in front of him, with the other end at his left, lay the square down flat on the spout, with the 10½-inch mark on the tongue fair with the edge of the spout next to him, and locate it about an inch or so from the end of the spout on his right and with the 12-inch mark on the blade, also fair with the same edge of the spout, and then will mark across by the upper edge of the tougue, he will have the work fairly commenced. Next pass around the end of the spout, just even with the other side, and holding the square as at first, place the 12-inch mark on the blade at the point where the first mark touches the edge of the spout next to him, keeping the 10½-inch mark fair with the edge at the right hand. Mark again by the tongue. Move the square to the right, placing 12-inch mark on the blade at a point where the last mark strikes the edge. Again mark by the tongue. Continue doing this, measuring eight times. The first and last marks will not only give the correct bevels, but also the correct length of the spout. Square down both edges at each end and cut them off, and the spout will be complete. By this plan your correspondent will have to use 10½ inches on the tongue 8 times, which is 84 inche or 7 feet from the base. He will have to use 12 inches on the blade 12 times, which is 8 feet to the second floor. I consider the above as simple and easy as laying off on a 10-foot measuring scale.

From A. R., *Huntington, W. Va.*—The problem submitted by "J. H. D.," of New Point, Ind., is so simple as to need no geometrical lines for its illustration. Measure 17 inches on the run, find the amount of rise over this point; then take on the blade of the square 12 inches and on the tongue the rise. The blade will give the cut in all cases where the box is square. I have never made a cut like this, but I know that the above rule will work.

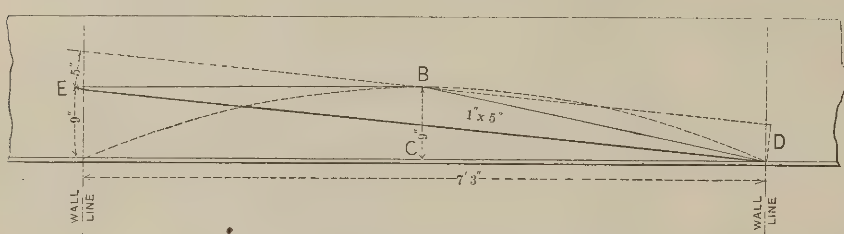
From E. H. D., *East Templeton, Mass.*—I wish to say to "J. H. D.," New Point, Ind., who asks about the grain spout in a recent issue of *Carpentry and Building*, that a good plan for him to pursue is as follows: Put together a box like the old wooden miter boxes. Make a cut across it corresponding to the pitch of the grain spout. Then nail up the spout, or a section of it, and place it in the box on the corner. This plan will obviate all trouble with points. Or your correspondent may place a board on one side of the spout in the box in the same position, as either side will take in the completed spout, and saw as before.

From P. C., *St. Paul, Minn.*—In answer to "J. H. D.," of New Point, Ind., I would say that I think the easiest way to get such bevels as he asks for is to cut the rise and run in a miter box and then cut the spout in the miter box. If the spout is too large for use in a box take a piece of 2-inch square stuff and cut that in the box and from it obtain the bevels for use.

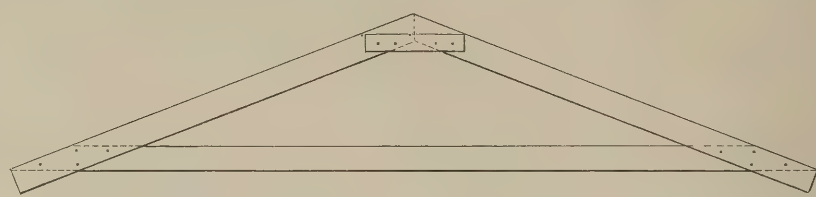
From H. C. E., *Scranton, Pa.*—In answer of "I. H. D's." question, I offer the following: Get the rise and run of the spout the same as if you were going to lay out a common rafter, with this difference: The rise must always be 1 foot, letting the run come to what it will. In this case the run is 10½ inches. Now, when you have got the run the rest is easy. Take 17 inches on the blade and the run, or in this case 10½ inches on the tongue of the square. Then 10½ inches will give the cut. No matter what the run is you must always take 17 inches on the blade. To get the length of the spout run on one corner the same as for a rafter. In this case taking 12, and 10½ will give the right length.

Describing an Arc.

From E. D., *San Antonio, Tex.*—I noticed in the August issue of *Carpentry and Building* an inquiry of "M. A.," of Whitney's Point, N. Y., with reference to describing a circle or arc without being able to get at the center. In answer to the question you say: "Drive pins at the extremity of the arc, and then put the vertex of a very obtuse angle between them, and by placing the pencil at the vertex of this angle and swinging it around, a more or less flat arc will be described." Your reply might have been more definite, and you might have pointed out how this plan may be made to work, producing an arc with a given rise. If "M. A." will name the spring line and the rise of the arc that he wishes to describe, or will name the diameter of the circle, an arc of which is wanted, I will strike the arc for him on the bench. For example, suppose an arch is wanted the spring line of which is 7 feet 3 inches and the rise 9 inches. Take a board, say, 12 or 15 inches, gauge back from the edge $\frac{3}{16}$, so as to give room to set nails or pins, as indicated by Fig. 1 of the sketches I inclose. Set up the rise 9 inches, as indicated by C B. Take a piece 1 x 5 and lay it on the wide board, then with a straight-edge strike the lines B D and B E. Then rip the boards to these lines and you have the correct obtuse angle for striking a given arc. If the board was 9 inches wide, only one line—namely, that from B to D, would need to be ripped, because the correct angle to strike any arc is that formed by a line drawn parallel with the spring line of the arc, cutting the rise point at the center, and one drawn from the vertex or rise through either extremity or end of the spring line. Now set the nail or pin at each extremity, and one at the rise point at the center. Then with the pencil at the vertex of the angle, swing from rise to spring line each way and the arc will be produced. If it is desired to get out a segment of any circle with given diameter, draw the circle to small scale, then draw a spring line to required length and measure the rise at the center and proceed in the same way as above. The second sketch illustrates how the angle could be made out of three narrow pieces. This method is useful where very large arcs are wanted.



E. D's. Method of Describing an Arc.


Construction of Triangle out of Three Pieces Described by E. D.

From C. E. H., *Toronto, Ont.*—Your correspondent, "M. A.," in the August number wants to know how to draw an arc inside of a building without going outside to find the center. It can be done by the means indicated on the sketch which I inclose. Take the two points A and B, representing the points where we wish the arc to start. Connect A and B and from the center of this line draw C D perpendicular throughout, making it the depth desired. Through the point D draw E F parellel to A B. Divide A C, A E, C B and B F each into the same number of parts—say, four. From B draw radial lines to the points 1, 2, 3, as shown. Then make the point 1 in A C, draw lines perpendicular to the line drawn from D indicated by D 1 as shown. In the same manner from the point 2 in A C, draw line perpendicular to the line D 2, of the lines drawn from D. Then a curve traced through the points of intersection, as shown, will be the arc sought. Of course the accuracy of this plan depends upon the number of points selected and the care with which the work is performed.

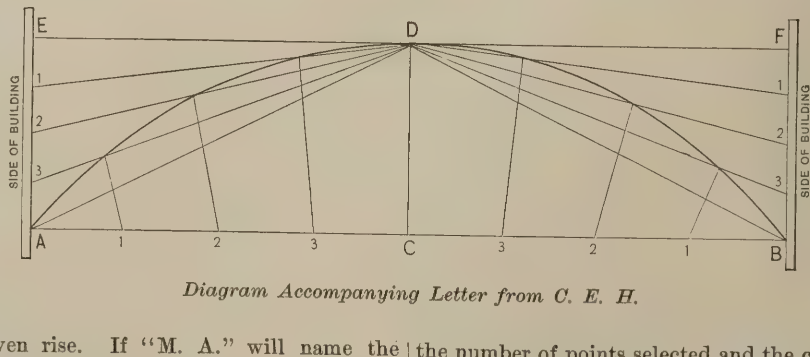


Diagram Accompanying Letter from C. E. H.

The Sheeting Question.

From S. F. B., *Wellington, Ohio.*—It would seem that the letter that I wrote *Carpentry and Building* some time since

upon the subject of sheeting has stirred up quite a discussion. I have read all that has appeared upon this subject since my last letter was published with much interest. "T. T. S.," of Stamford, Conn., some time since asked me to show my hand, and accordingly I crave enough space to do as he requests, for his information and for the benefit of others who may be interested. At the outset, let it be understood that I refer to such material as is generally used on good work, plaster, lath, studding, one thickness of sheeting, or, as it is called in New England, wall boarding paper, and sliding or clapboards. I worked in Maine three years and in and about Boston ten years, and, as I have said before, I have never seen nor heard of inside sheeting until I came to this central country. I have seen a great many works and also a great many drawings, and I have examined copies of the building-trade papers, but I do not find inside sheeting mentioned. I am afraid that "T. T. S." will find that inside sheeting is one of the lost arts, in this section at least. In my opinion it ought to be one of the lost arts in this region of the country.

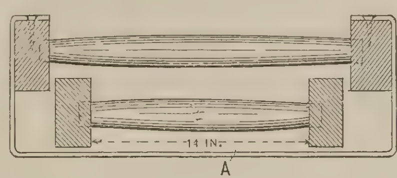
I will now attempt to give my reasons against inside sheeting and in favor of outside sheeting, leaving the decision with the readers of the paper. Studding varies in width, and when it is sheathed on the outside it draws the studs, and any crooks or bends on the inside are evened up by the mason. The outside is smooth and straight, and is covered from the bottom of the sill to the top of the plate, and then the paper is laid on smooth and no air can get in through the laps after the siding is in place. I pay no attention to studs when putting the siding on. I use 2-inch wire-nails, about 12 inches apart, and keep them out of line, up and down, as much as possible. A straight row of nails up the side of a building does not look well, and, besides, it is sure to get the siding tight against the paper and sheeting, and makes it air-tight and closes the ventilators. Another advantage is that there is no waste of siding, as each piece can be worked its full length and nailed back far enough from the end to avoid splitting in case of shrinkage. I use wire nails because they do not tear the wood like cut nails, and the heads drive in very smooth and show very little when painted, but wet is apt to follow a cut nail even after the work is painted.

I might agree with "R. G. M.," that inside sheeting is a good thing, but if I can have but one I will put the sheeting on the outside. I have built some nice houses in this vicinity and the owners are satisfied that I am right, although some of the grandfathers tried to make them believe that I was wrong. I never hunt for studs; I stud full and put my openings in afterward, putting in headers top and bottom. This construction stiffens the openings and gives solid nailing all around. I double the studs and block the corners for base, and before the walls are plastered I make a heavy pencil mark on the floor to show where the studs are. Packing may be good, but I prefer an air space when I can get it tight.

Now, then, for inside sheeting. We generally use a plank sill, laid flat on the wall, and set the joists on them. This construction gives the full strength of the joist and the inside sheeting is started at the top of the joist and is seldom closed up between the joists, which leaves a chance for cold, damp air to draw up between the plaster and the siding. Then the siding is stopped at the sill and started again at the top, which gives a chance for air to circulate clear around and between the joists. Again, if the siding varies in width, the sheeting will draw out of line and the siding will not draw them back. This leaves the walls wavy, which looks bad. As "T. T. S." says, the thin edge springs in and leaves a wind hole at every lap from the ground up. If paper is used on the studs it gets wrinkled and torn and is about as useless. If a piece of siding reaches almost to the next stud it has to be cut back and wasted and nails have to be driven so near the ends that they are liable to split out and make more ventilation. If dry paper is put back of the plaster it wrinkles up, and if tarred paper is used it smells for years in hot weather, as I know by experience. I admit that inside sheeting makes a solid wall, but I claim that siding paper and sheeting on the outside, notwithstanding this fact, make the best and warmest house. I think that seven out of ten of the readers of *Carpentry and Building* will agree with me in this.

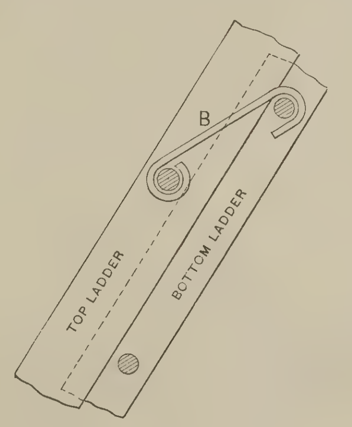
Extension Ladder.

From L A., *New York City.*—Regarding the request made by a correspondent for a description of an extension ladder, my experience is, that it is a good plan to buy them ready made. As it may not be convenient for all to do so, I will give a description of one, as well as drawings. Fig. 1 is an end view of a ladder made from $1\frac{1}{2}$ x 3 inches Norway pine, and when extended is 25 feet long. The rounds should be made of some hard wood, 1 inch in diameter at the ends, and about $1\frac{1}{2}$ inches in the center. The hole for rounds should be bored only half-way through the wood



Cross Section Through Ladders as Proposed by L. A.

sides, as shown in Fig. 1, and the rounds can be fastened by putting in screws through the sides, or by having iron rods go through the ladder. The iron A can be made from $\frac{3}{16}$ x $1\frac{1}{2}$ bar iron, and fastened to the top of the bottom ladder by screws. Fig. 2 is a side view of Fig. 1,



Side Elevation of Top and Bottom Ladder as Arranged by L. A.

showing how the hook B is placed so as to hold the top ladder in any required position.

Study in House Planning.

From T. H. R., *Parsons, Kan.*—In reference to my house plan published in the October number of *Carpentry and Building*, and which you referred to your readers for attention, I, as one of said readers, desire to explain my design a little more in detail, and also to criticise somewhat the Editor's remarks about it. In my former letter I should have mentioned that the house was to be heated by furnace, steam, or hot water. Therefore the location of the chimneys was not so much of a misfortune as you have been led to believe. It was my intention to make such arrangements that stoves could be used, if necessary, in every room. The only long pipe required will be in the kitchen, where a horizontal section 7 feet long will be needed, the stove being set against the partition inclosing the back and cellar stairs. I have decided to run the attic stairs up over the back stairs, taking out the partition on the east side of the closet in the servant's room, the house facing the south, and starting the first or lowest step at this partition. It is my preference not to construct a closet in this room. You suggest that "if the attic stairs were carried up over the back stairs instead of the front stairs, the space over the front stairs could be utilized as a closet in connection with the front bedroom, thus putting that room in better shape than it is at present, and extending its length nearly 3 feet." This, I desire to say, is impossible on account of "head room" required over the front stairs. If the door to the attic stairs is closed with a partition, there will be about 6 feet 7 inches head room between there and the step immediately below. In regard to the water supply in connection with the bathroom, I desire to say that the omission of water-closet is only an error in the drawing. I did not contemplate a tank in the attic for water supply, as there are few towns of 3000 inhabitants in this section of the country which are not provided with a system of water works, as well, also, as an electric light plant. Before closing this letter, it is my wish to add a few words relative to other advantages, mention of which was omitted from my first letter. The principal rooms are protected from the north winds in winter, making a more economical house to heat. It is possible to go from any room to another, upstairs or down, without passing through another room. Throughout the entire house there is not a single door which opens against a window, obstructing the light, and with the exception of two doors under the front stairs, there are none which interfere with other doors. These are small items, it is true, but they count.

Selecting a Superintendent.

From M. R. D., *Lincoln, Neb.*—I would like to ask the numerous subscribers of *Carpentry and Building* this question: When two contractors compete on a piece of work, is it the custom to place the defeated competitor on the work as superintendent?

Note.—Our correspondent evidently desires an answer to this question from our readers at large. We may be excused, however, for offering an opinion in passing. We have known the defeated competitor to be made superintendent in a number of cases, but do not think that such a rule prevails throughout the country. There are good reasons why it should not prevail. Where such a plan has been resorted to, it has been either for the reason that the defeated competitor wanted something to do and was glad to get the job of superintendence if he could not get the job of building; or that the work was given him because it was believed that, being a competitor, he was qualified to look after the owners' interests very carefully.

Care of Oil Stones.

From JACK RAFTER, *Monroe, Iowa.*—I would say for the information of my brother chips that if they will face their oil stones, joint them straight by rubbing on a large flat stone, plate of iron or even a hard board on which sand and water

have been placed in sufficient quantity, they will greatly improve the cutting quality of the stone. If treated in this manner as often as it becomes perfectly smooth the owner will in many instances be surprised at the rapidity with which it will perform its work, as well as the edge it will set on the tool, even though the stone may not be a first-class article. The oil stone is a cutting tool, and should be kept true and sharp. Boiling in strong soap suds will improve nearly all oil stones if treated in this manner two or three times a year. It has the effect of extracting the gum and leaving the stone in as good condition as when new.

The Noon Hour.

From S. B., *Paterson, N. J.*—It may sometimes happen that after the boys in the shop have finished eating their lunch of cold turkey or chicken, that a few moments might be passed investigating the following game, which introduces a limited amount of arithmetic. Forming the

The Noon Hour.—The Q Puzzle.

letter Q from any convenient number of rivets (screws, nails, or even chips will answer as well), the operator requests any one to commence counting at the tail of the Q and up the left side of the circle, stopping at any rivet he pleases. He is then to call that rivet No. 1, and to count back again the same number, but this time not descending the "tail," but proceeding up the right side of the circle (as shown by the small figures). The person who conducts the game can, without having watched the person count, tell at a glance the last rivet touched. The fact is, the last rivet touched is governed entirely by the number in the tail. From D to A is six counts, and so from A to B will be the same number. It makes no difference how far one counts to the left, he goes over the same number going from A to B as from D to A. To operate the game, one should change the number of articles in the body and tail of the Q, so people will not learn how it is done, as they might if the stopping place was always at 16 or B. If one more is added to the tail, then the stop would be at the seventh rivet from A. When work is to be laid out so as to have the holes punched before the work is formed, sometimes one may be reminded of the "Q" puzzle.

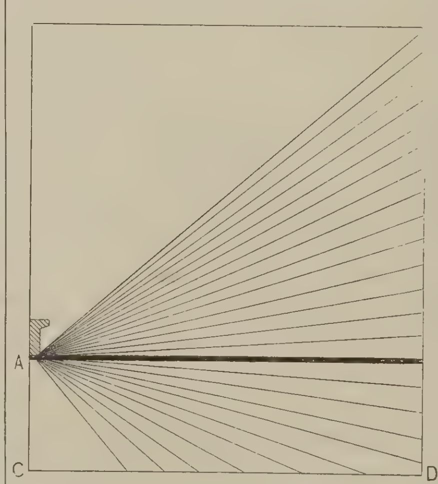
Pressure in Hot-Water Apparatus.

From AMATEUR, *Battle Creek, Mich.*—I would like to gain a little information. Why does the gauge upon a hot-water apparatus indicate pressure? In a car, for instance, or other high-pressure apparatus, the gauge may indicate 25 or 30 pounds and the column of water in the expansion-tank would not raise it more than 2 or 3 pounds. Does water keep on expanding after reaching 212°, or does the apparatus make steam and raise the pressure, notwithstanding the fact that there is no steam space or vacuum?

Answer.—The gauge on the boiler or heater of a hot-water apparatus, when open to the atmosphere, indicates the pressure due to the column or head of water measuring from the highest point, generally the level of water in the expansion-tank. In a car heating or other high pressure or high temperature or closed hot-water apparatus the pressure on gauge is due to the expansion of the water caused by the temperature absorbed by it, if no space has been left to allow for the expansion which takes place between the normal temperature of the water and 211° F. Space for this expansion is generally provided, and any pressure indicated before the water is 212° is due to the expansion of the water and the compression of the air in this space. When pressure is observed on gauge after the water has reached 212°, it is due to the production, it might be said, of numerous globules of steam, which attain the higher sensible temperature above 212°, as well as the latent heat. Water, on reaching 212° F., is transformed into steam. Steam may be "saturated" with water—or may, rather, mechanically hold an excessive quantity of water in particles until these particles are turned into steam by additional heat. To produce steam from water, additional space or vacuum to receive the steam is not necessary. Steam, being elastic, is subject to great compression. The destruction of water by heat results in the formation of steam.

Setting Grates.

From M. T., *St. Paul, Minn.*—As the open fire warms by radiation, is it best to place fireplaces as low down as many are now placed? Every one knows that the tendency of heated air is to rise, so there is little danger that the upper part of a room will be too cool if the floor is warm enough. When a grate is set too low down the rays of heat do not strike the floor as they would if the grate was higher up. It is said that the sun is nearer the

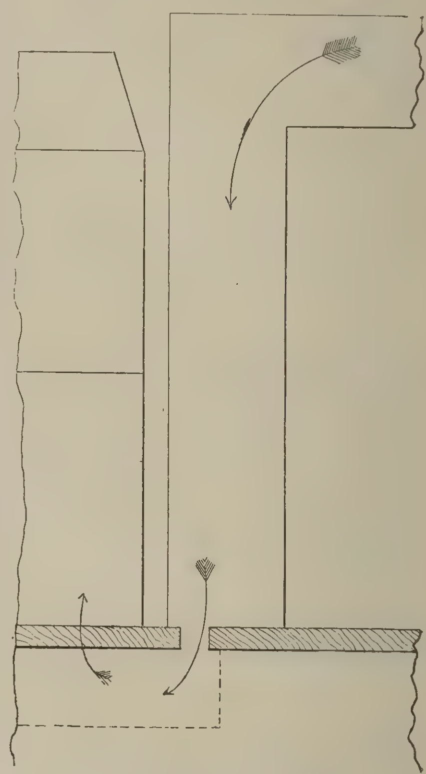


Setting Grates.—Diagram Illustrating the Direction of the Rays of Heat.

earth in winter than in summer, but as the rays of heat do not strike as direct, the winter is the coldest season of the year. Referring to the inclosed sketch, let the grate be located at A. If the floor was nearly as represented by the line A B, it would not receive as much heat as if at C D. It should be remarked that the rays of heat from a fire are supposed to be rather closer together than the lines in the drawing would indicate, but the diagram illustrates the point I desire to make. I would like to see this question discussed by the practical readers of *Carpentry and Building*

A "Restricted" Cold-Air Box.

From L. M., *Baltimore, Md.*—When a heating furnace refuses to operate properly, it is sometimes quite difficult to discover the trouble; yet, when the discovery has been made, it is then very easy for any



A Restricted Cold-Air Box.

one to "see the point." Such an event occurred some time ago in my practice, as the doctors would say. Some changes had been made in the basement where the furnace was located, a new floor had been put down, and a general fixing up had occurred. When the furnace was started off, as the cold weather came on, it refused to operate as well as before. Being called to the house to see what was the difficulty, it was some time before the discovery was made. By referring to the sketch the reader can discover where the trouble was. The person who had constructed the floor had most entirely closed the opening for the cold air to pass into the cold-air pit. The cold-air box appeared to be all right, and it was only when it was removed that the difficulty was discovered; and when the opening was made as large as the cold-air box there was no further trouble.

Plaster Cracking.

From W. R. W., *Pottsville, Pa.*—I would like to learn, through *Carpentry and Building*, the reason of some plaster cracking. I have just finished a large house, being 42 feet front and 32 feet deep, with a back building 20 x 39 feet. The building is well constructed with well-seasoned hemlock timbers. A 20-inch stone wall furnishes a solid foundation. There are no signs of settling of any kind. The walls were built last September, the house was raised in October, and the plastering was done in the beginning of December. We left the plastering to dry until the middle of February, and then began to put on the white coat. Three or four days after the plasterers left the room it began to crack.

As a general thing, the cracks occurred where they made the joints in the wall. The cracks lead from these lines in all directions. The ceilings are troubled the same as the walls. The sand used in the mortar was, for the most part, found along the country roads or pikes; some of it was brought from a branch of the Schuylkill, and was about one-half coal dirt and the other half loam. There were no cracks visible in the plastering until the white coat had been on a day or two, and then they began to show an increase day by day. There seems to be some other trouble with the white coating itself, for in many places it is chipping and falling off from the wall in blisters.

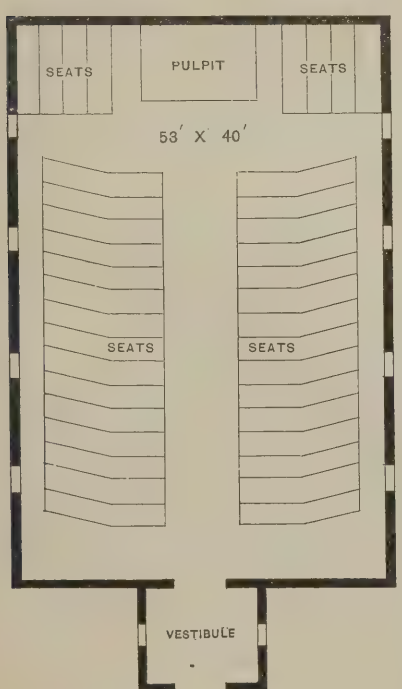
Note.—Our practical readers will, perhaps, think that our correspondent has, in a measure, answered his own question. It would seem, from what he says, that the plastering has been done with poor materials in an insufficient manner. Beyond this, we are unable to make criticisms in view of the meager information he has supplied.

How to Paint a House.

From Y. Z., *Newark, N. J.*—There are a variety of ways to paint a house. One way is to put up the ladders, and then paint the house—and about everything else at the same time. Even the grass will have paint on it, and one can see that the house has been painted simply by looking at the lawn. There is another way of painting a house. Place old canvas under the ladders, and then when the painting has been done and the canvas removed everything looks as well as it did before the painter made his appearance, which is saying a great deal. The way to paint a house, then, is as follows: Paint the house, but do not paint the town (red), nor the grass, nor anything whatsoever except the house.

Heating a Church.

From G. B., *Middletown, Ind.*—Will you give such information as you can, from the following description and drawing, and thus help us out in a dilemma?



Heating a Church.—Fig. 1.—Plan of Building Engraved from Sketch Inclosed by G B.

We are remodeling our church, and desire to heat it from a small cellar or basement, with two large stoves. The basement in which the stoves are to be placed is about 40 feet wide, and 10 feet across. We propose to inclose the two stoves with jackets, and from them, separately, or together as

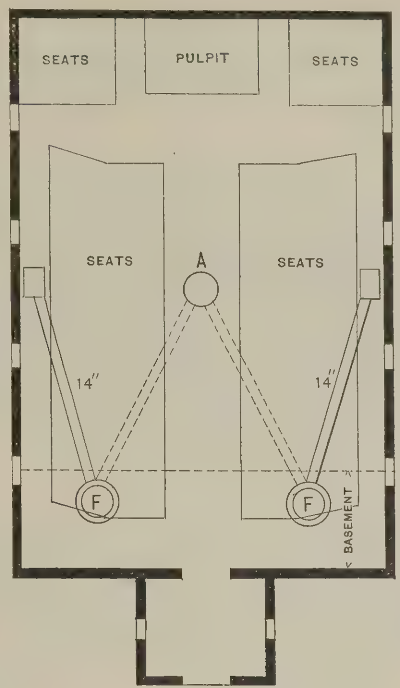


Fig. 2.—Suggested Arrangement of Heaters.

it may be best, run a hot air-pipe the length of the building, and from it, other pipes as may be necessary, to the sides of the building. Fuel is no object, as we

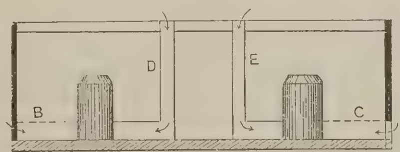


Fig. 3.—Cross Section Agreeing with Fig. 2.

have natural gas furnished free. Would like your advice as to the size of jacket in proportion to size of stove, size of hot-air pipes, and how to get proper supply of cold air. We also inclose plan of inside of building, and would like to know how many registers to put in, and their location, and how to dispose of cold and foul air, all to be done as economically as possible. As we have never before done any furnace work, we presume upon your knowledge and kindness to those in want of such assistance. It should have been mentioned that the stoves are to be located under the west end of the main building.

Answer.—Our correspondent would perhaps do better to buy furnaces for this purpose instead of trying to make furnaces out of stoves. However, we answer, as they have offered the question. Regarding the jackets, or casings for the stoves, they should be made about 4 inches larger than the largest parts of the stoves. It is just as much of a mistake to allow too much room for the air as too little. As there is no description given of the kind of stoves that are to be used, more precise directions cannot be given. Regarding the manner of conveying the heated air to the church, two ways are given in Fig. 2. The two incased stoves are represented by the letters F. From these two heaters, two pipes, 14 inches in diameter, might be run to the aisles on the outer side of church, and represented by solid lines, and 14 x 20 registers used. It would appear that, by having the registers located near the center of the outside aisles, the heat would be more evenly diffused than if they were located nearer the heaters. A second plan is shown by means of dotted lines in Fig. 2. A pipe is taken from each heater and conveyed to a 24-inch round register, A, in the central aisle, this would throw the heated air up to the ceiling from the center of the church, in a manner that many furnacemen would recommend. Regarding the introduction of fresh air, cold-air boxes, Fig. 3, B and C could be run from the outside of the building, and in these boxes could be placed dampers so the supply of cold air could be regulated at will. There could be no harm in putting in another set of cold-air boxes leading from the floor of the church, as represented by D E. Where the boxes connect with the floor registers could be placed, then the air could be taken from the outside or inside, as circumstances might require. Regarding the means to be employed to remove the foul air, if there is a chimney that is not to be used by either of the stoves a register might be placed in the bottom to take out the foul air. If there was not an extra chimney, a special flue could be constructed that would answer the purpose. It might be well to state that in the heating of churches it most always happens that the furnaceman is hampered by circumstances or by surroundings that prevent him from doing as he would wish. If one thing does not happen, another will be sure to turn up. One might conclude that about the last thing thought of by many builders is the location of the heating apparatus. As long as such is the case, it would be difficult for the furnaceman to locate, put up, and operate heating furnaces in the manner that could be desired. We have said nothing about the adaptation of the stoves or furnaces to the use of natural gas. Perhaps some of our readers will be willing to take up that part of the subject.

REFERRED TO OUR READERS.

Questions About Plastering.

From F. D., *Dunmore, Pa.*—There are several questions about plastering that I would like to refer to the practical readers of *Carpentry and Building.* Is it a rule not to put hair in the brown mortar—in other words, the mortar which is put on as soon as the first coat is in place, of two-coat work? Can a good job be made without hair in the second coat? Which is the better, hair or no hair?

Durability of Timber.

From J. M. C., *Woonsocket, R. I.*—I desire to ask the practical readers of *Carpentry and Building* which kind of wood, spruce or hemlock, in the form of boards ⅞ inch thick, will better stand exposure to the weather? Which will last longer under the same conditions—not painted?

Balloon Frame.

From E. T. H., *Truxton, N. Y.*—I would like to obtain through the columns of *Carpentry and Building* plans for sticking up an ordinary balloon-frame house. This subject will be of interest, I think, if discussed by some of the practical readers of the paper. At the same time, would some one please tell me how to put up the end pair of rafters of a roof in a way to get them plumb?

Tool Chest.

From Jack Rafter, *Monroe, Iowa.*—I wish to build a convenient tool chest during the coming winter and would consider it a favor if some of the readers of *Carpentry and Building* would send to the Editor plans for publication.

NOVELTIES.

Improved Emery Paint Mill Grinder.

Below we present a view of a paint mill grinder, which has been placed upon the market by the Hall Mfg. Company, of Philadelphia, Pa. The purpose of this device is to do by the use of rapid machinery what has heretofore been accomplished by the slow and uncertain precess of hand filing. Hitherto it has been considered practically impossible by hand to file the grooves into the mills with mathematical exactness, and the frequent truing of the faces, combined with the sharpening of the grooves, involved great labor, with more or less uncertain results. The machine, which is shown herewith, is designed for truing-up the grinding surfaces of iron mills used for grinding paint and the like, and to accomplish in a very short time work which by the old method would require a day or more. In the engraving here presented, the machine is shown with the chuck ready to receive the sections of the paint mill, which are indicated at the base. This chuck firmly holds the mill at the required angle, and moves in every direction necessary for the performance of its work. It is raised and lowered by means of a screw operating in the nut shown at D in the engraving, which provides for the upward and downward movement of the work to the one-thousandth of an inch. The machine is provided with a double spindle carrying two wheels, and is claimed to be useful for all purposes required of a first-class emery grinder. The spindles are carried in split composition boxes, and operated with set screws to allow for taking up the wear. These set screws are surmounted by nickel-plated oil cups, and the spindles are held in position by collars on each side of the head. The bearings and collars are thoroughly protected by brass cups, backed with leather packings to insure against emery dust. Each machine is provided with a rest for grinding tools, a wrench, a shelf to hold small tools, a $\frac{1}{4}$-inch oval face emery wheel for grooving the faces and a $\frac{1}{2}$-inch bevel-edged emery wheel. The base of the machine occupies a space of 18 inches square. The hight of the machine from the floor to the center of the spindle is 43 inches. The manufacturers claim that the mills sharpened upon the grinder here shown will give much better service than those sharpened by ordinary methods.

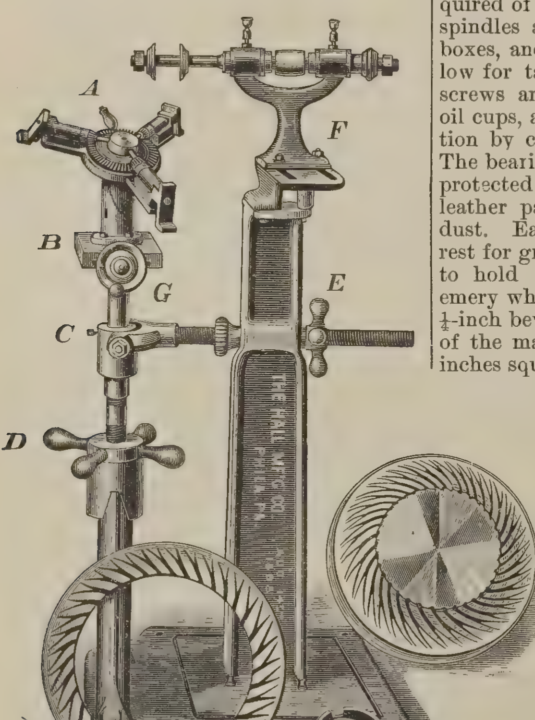
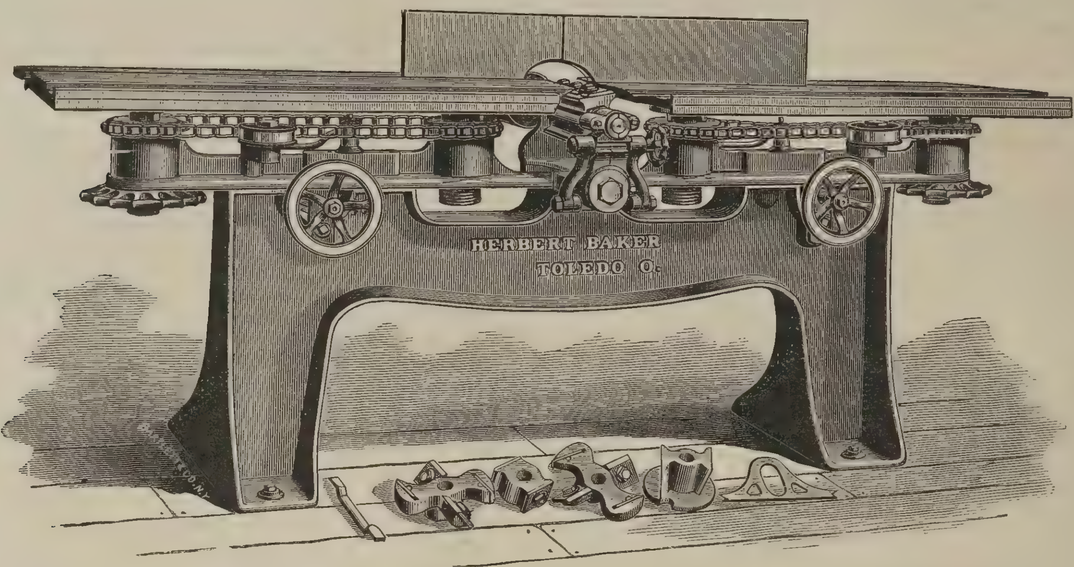


Fig. 2.—Improved Emery Paint Mill Grinder.

Improved Universal Wood-Worker.

The Herbert Baker Foundry and Machine Works, located at Toledo, Ohio, have brought out a new machine under the above title, adapted to the requirements of wood-workers, a general view of which is afforded by Fig. 1 of the illustrations. This machine has been produced to supply a demand for a moderate priced construction which will satisfactorily perform a great variety of work. It embodies a number of novel features and is designed to plane out of wind, plow, gain, bevel and joint, and also to square, cross-cut, rip and cross-gain, and, in fact, do all descriptions of work common to machines of its class. The sill and legs are made in one piece. By reference to the engraving it will be seen that the adjustable tables are carried, each upon two large adjusting screws, which are connected in pairs and operated by a connecting chain. The manufacturers claim that this arrangement insures easy adjustment, and, with the horizontally adjustable carriers, has a very wide range in the position of the tables. The machine is furnished with an improved divided fence, the parts of which are provided with an adjustable connection, one part resting upon the front and one upon the rear table. The arbor is carried in a frame which connects both boxes, one of which is removable for the purpose of exchanging cutter heads. The company furnish with each machine a planing head 8 inches long, one jointing head, one molding head, one rabetting head and a countershaft. Special heads and special attachments can be furnished when desired. The machine is claimed to be carefully constructed in all its parts, is very firm and stable and is said to perform its work in an entirely satisfactory manner.

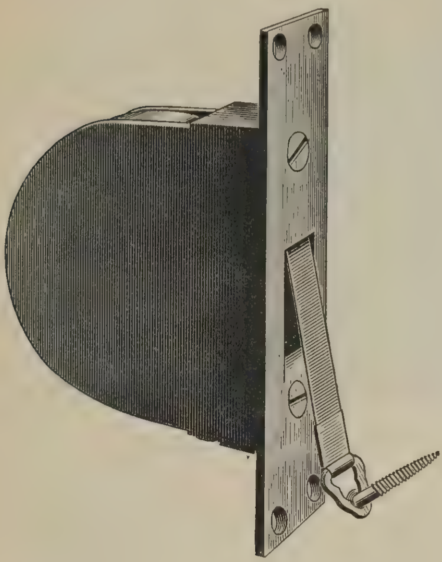


Novelties Fig. 1.—Improved Universal Wood Worker.

The Caldwell Sash Balance.

A substitute for the ordinary sash cord and weight, possessing certain features of novelty, is being introduced to the building trades by W. H. Caldwell, of Nos. 288 and 290 State street, Rochester, N. Y. A very clear idea of the general appearance of the device, which is known as the Caldwell sash balance, may be gathered from the engraving presented in Fig. 3. The balance consists of a casing or outer shell, within which is placed a cast-iron drum carrying a coil spring. Attached to one end of this spring and wound about the drum is a narrow brass tape, the outer end of which is shown in the illustration projecting through the opening in the face-place. By reference to the engraving it will be noticed that there are two screws indicated in the face-plate of the device. By turning these screws the outer edge of the plate is drawn forcibly against the side of the roller or drum, thereby clamping it, as it were, against the fixed side of the plate and holding it with any desired tension. The adjustment is made before the fixture is applied to the casing of the window and causes the roller to run with greater or less friction as may be found desirable. A feature of construction to which the maker directs special attention

is the manner of attaching the tape to the sash. This is accomplished by setting screws in the edge of the sash sufficiently below the surface not to interfere with



Novelties.—Fig. 3.—The Caldwell Sash Balance.

the casing and securing the tape by means of the brass loop, clearly shown in the cut. This, the manufacturer claims, admits of the easy removal of the sash from the window for needed repairs or cleaning, it being only necessary to unhook the loop from the screw and allow the tape to wind into the balance. The point at which the loop is attached to the tape is made sufficiently large to prevent that end when released from the window sash from disappearing within the outer casing of the balance. It is claimed for this device that it is applicable not only to window sash, but also to lifting doors, show-cases and similar work. It is so constructed that it may be adjusted to different weights according to the work required of it. While recently introduced to the trade, it has been tested in a number of buildings in Rochester and is being put into others in process of erection. It is well made and is claimed to be durable and economical.

New Double Saw Bench.

Mr. Frank H. Clement of 131 Mill street, Rochester, N. Y., has recently brought out a new double saw bench, a perspective view of which is afforded by means of Fig. 4 of the illustrations. This device carries a rip and cross-cut saw placed side by side upon separate arbors, either of which may be quickly raised or lowered by means of adjusting screws clearly indicated in the engraving. This machine is made with a massive iron frame cast in one piece, rendering it perfectly rigid. A large central throat is also provided which gives easy access to both saws. A slitting gauge accurately stopped for square or miter work is clamped on a way outside of the table. The arbor frames are rigidly stayed at both ends. There is also provided a screw adjustment of the arbors endwise. This machine is carefully made in all its parts with an adjustment of arbors, table and gauges, which insure accurate cutting for fine work. The machine is guaranteed to be as represented, and will be found of satisfactory operation by those who are called upon to employ devices of this kind.

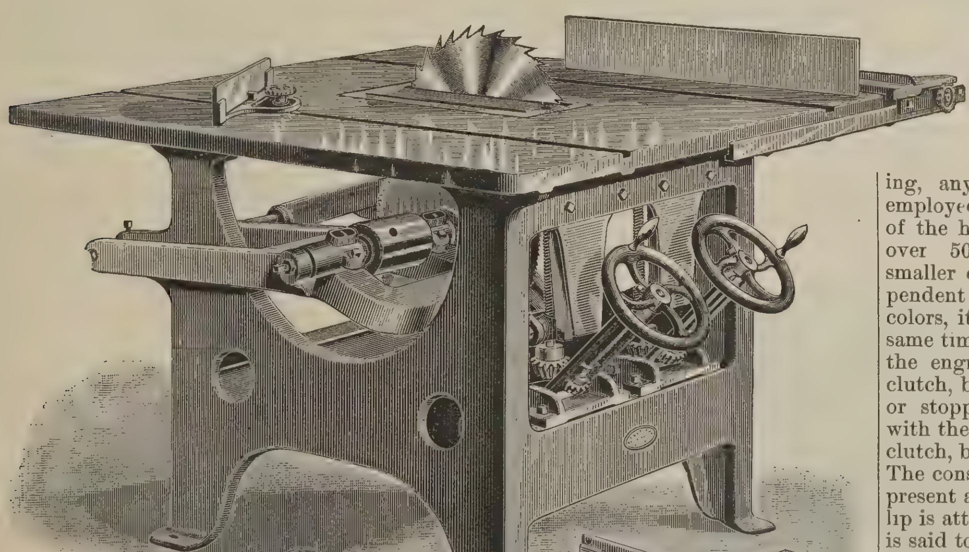


Fig. 4.—Double Saw Bench, Manufactured by Frank H. Clement.

Improved Quadruple Mill.

The Hall Mfg. Company, of Twelfth and Buttonwood streets, Philadelphia, Pa., are offering the trade what they are pleased to call the New Improved Hall Quadruple Mill, designed for grinding purposes by manufacturers of paint, ink and chemicals. This machine, a general view of which is afforded by Fig. 5, was first placed upon the market about a year ago, since which time it has been more or less improved, and is now considered satisfactory in every particular. All the parts are interchangeable and are constructed with a view to performing heavy work. By reference to the engraving, it will be seen that the mill is provided with a large hopper, into which the material to be ground is placed. This hopper is arranged with four smaller separate hoppers, shown at A in the engraving, any one or all of which may be employed as desired. The total capacity of the hopper in a No. 3 mill is a trifle over 50 gallons of paint. As these smaller or sub-hoppers are entirely independent of each other, four different colors, it is claimed, may be ground at the same time without danger of mixing. In the engraving, B shows the arm of the clutch, by which each runner is started or stopped instantly without interfering with the others, and F is the lever of the clutch, by which the mill is put in motion. The construction of the parts is such as to present a very large grinding surface. A lip is attached to the bottom runner, which is said to effectually prevent the spattering of the paint when the mill is in rapid motion. The pipe shown in the cut at D communicates with the oil cup by which the running gears are oiled. These running-gears are covered by a cast-iron apron, which entirely protects the parts from paint and dust and insures easy running. The mills can be run in gangs of three or four, it is claimed, with less power than is required for a proportional number of other mills. The No. 2 mill is provided with four runners of 10-inch diameter, having a hopper 9 inches high and a capacity of 16 gallons. It occupies a floor space of 24 x 24 inches and weighs

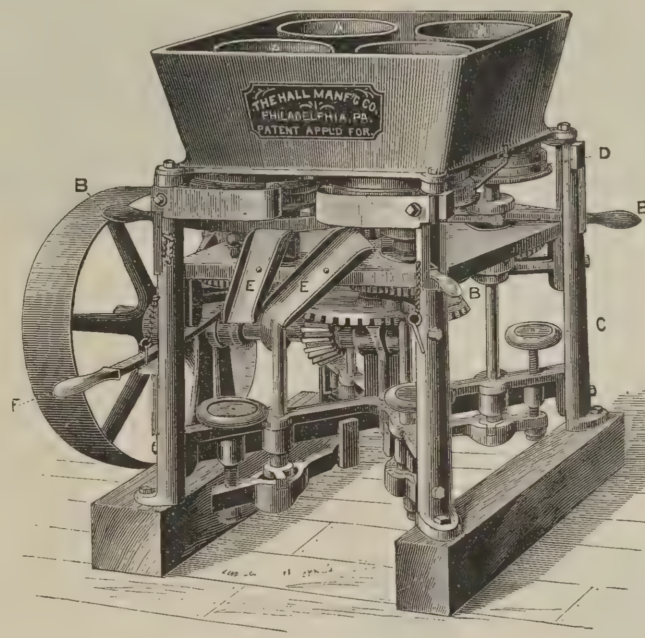
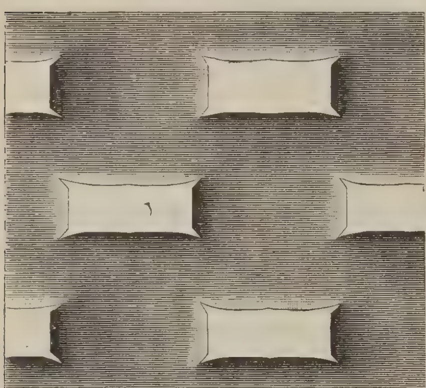


Fig. 5.—Hall's Improved Grinding Mill.

750 pounds. The No. 3 mill is provided with four runners of 16 inches diameter, having a hopper 12 inches high, with a capacity of 50 gallons. It occupies a floor space 36 x 36 inches in size and weighs 1750 pounds. A special feature to which the manufacturers direct attention is the freedom from heating. It is stated that any oil or coach color may be ground in these mills without the slightest danger of heating, and this without the aid of water. The grinding runners are so disposed that they can be quickly detached for resharpening, and one set can be removed while the others are in use. The company claim for their mills economy in floor space, shafting, power and labor, perfect work in fast grinding, strength and durability.

New Metallic Lathing.

Prominent among the exhibits at the American Institute Fair, New York, now in session, is a miniature building, lathed and plastered, in the construction of which is employed what is known as the Hayes System of Metallic Lathing, Furring, &c., an invention that has recently been introduced by George Hayes, the well-known manufacturer of skylights and other glazed structures, of 71 Eighth avenue, New York. From even casual inspection it is evident that the improvement possesses more than ordinary merit. Briefly, the invention consists of a



Novelties.—Fig. 6—Back Elevation of a Portion of Perforated Sheet for Lathing.

sheet of iron or other metal perforated in such a form as to provide holes for the clinch of the plaster, and with burrs turned outward in a way to use the punching, to still further hold the mortar in place. Referring to the en-

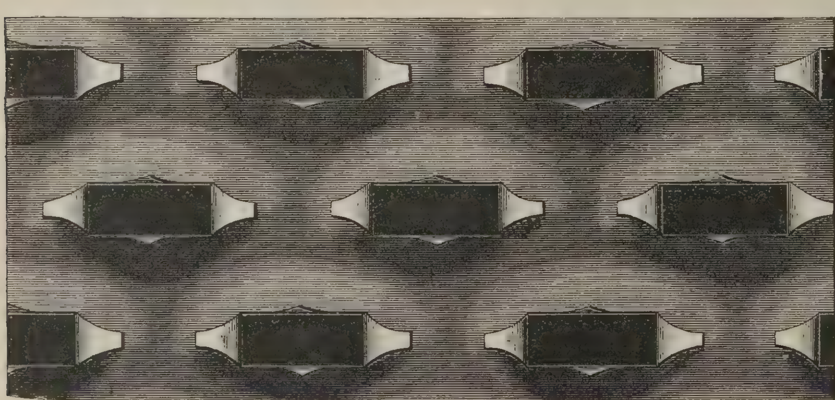


Fig. 7.—Elevation of Front of Portion of Perforated Sheet.

gravings, Fig. 6 shows a back elevation of the lathing, and indicates how the holes are punched. Fig. 7, on the other hand, is a section of the front elevation of a sheet of the lathing. The lathing is manufactured out of sheets of metal 40 x 96 inches or less in size, over the surface of which, at near intervals, are openings $\frac{5}{16}$ inch wide by $\frac{3}{4}$ inch long, produced by puncturing, as already mentioned. The flanges

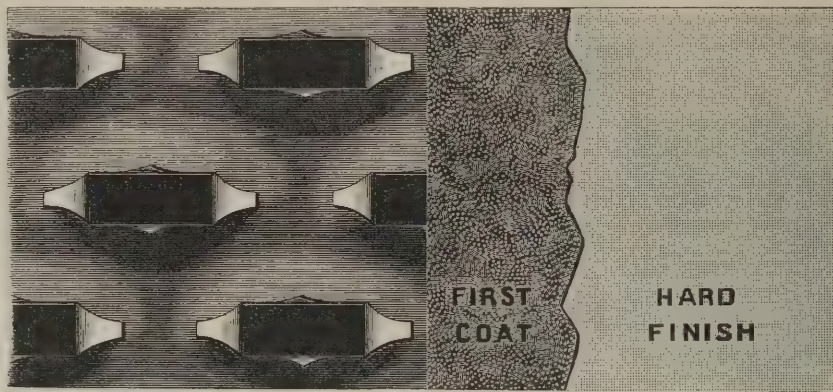


Fig. 8.—Elevation of Section of Lathing with Plastering Applied to a Part.

around the openings are pressed forward and curled outward, forming lips or hooks which clinch or hold the mortar to the surface of the sheets, while at the base of each opening there is formed a matrix into which the mortar is pressed, and by which

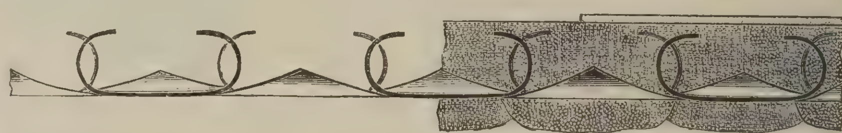


Fig. 9.—Horizontal Cross Section Corresponding to the Above.

perfect dovetailed clinches or bonds are obtained. The process, it is pointed out, imparts to the sheets an undulated surface, giving additional strength thereto. The mortar or plastering material is spread over the surface of the sheets, embedding the lips and hooks and filling the matrix, thereby, it is claimed, permitting a degree of coalescence which insures perfect and substantial work. The inventor points out that there is an entire freedom from expansion or other organic action, which would be liable to disrupt, strain or in any other way injure the bond. Cracking or falling away of the surface of the wall or ceiling, under any circumstances, it is claimed, is impossible. So solid is the coating that it can only be removed by picking it off in particles. Among the advantages to which attention is prominently directed we note the following: Less mortar is used than upon any other fire-proof lathing; the mortar may be applied stiffer than is the ordinary practice; scratch coating is entirely dispensed with; for one coat work this lathing affords an effectual finish; less hair, and shorter hair than commonly employed, may be successfully used. It is claimed, further, that by plastering with a good quality of gauged material a good result may be obtained without any hair. Fig. 8 of the engravings shows a section of the lathing, a portion being covered with the first coat, and a portion of this, in turn, being hard finished; Fig 9, which corresponds with this, shows a horizontal section, while Fig. 10 is a section in the opposite direction—or, in other words, a vertical section through the portion that is hard finished. In connection with this invention Mr. Hayes has perfected various architectural features which will be appreciated by builders in general. The lathing sheets can be readily bent to internal and external angles, and

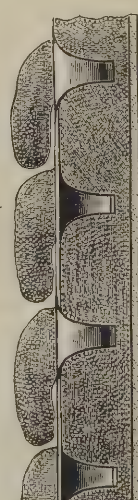


Fig. 10.—Vertical Section through Finished Portion.

when so bent adapt themselves to any form of combined lathing, furring and screeding, and also to meet certain features in architecture, such as pilasters, columns, niches, groins, cornices, bases, angles, trimmings, &c In the pamphlet which the inventor has issued, several engravings are presented which illustrate this feature. One application of this improvement, which will be very generally appreciated by those of our readers who have to do with office buildings and similar structures, is in the construction of fire-proof partitions. Figs.

11 to 17 inclusive show sections of double-faced two-coat plaster partitions, ranging from 1½ to 2 inches in thickness, and showing different plans of working the material. In his description, the inventor says that this system of lathing admits of the construction of strong partitions of from 1½ inches thickness, upward, with double-plastered faces. The partitions are made by forming in the

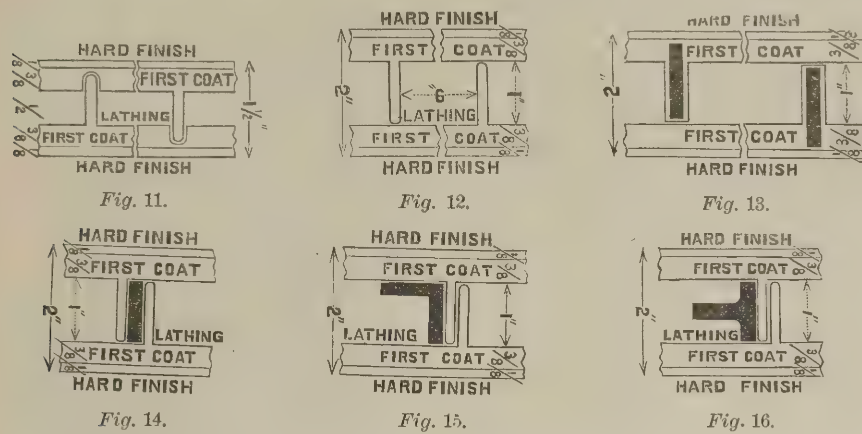


Fig. 11. *Fig.* 12. *Fig.* 13.

Fig. 14. *Fig.* 15. *Fig.* 16.

Novelties.—Figs. 11 *to* 16.—*Sections of Double-Faced Two-Coat Plastered Partitions.*

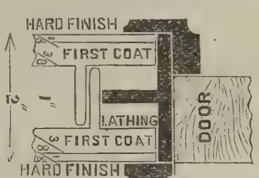


Fig. 17.—*Method of Framing Doorway to a 2-inch Double-Faced Two-Coat Plastered Partition.*

lathing sheets which, by virtue of the peculiar punctures, already have rigidity, a series of ribs such as are made for furring, and which are secured to each other back to back, and, when necessary for an increase in strength, reinforced with a framework of band or bar iron or with angle or T-iron, as shown in the engravings referred

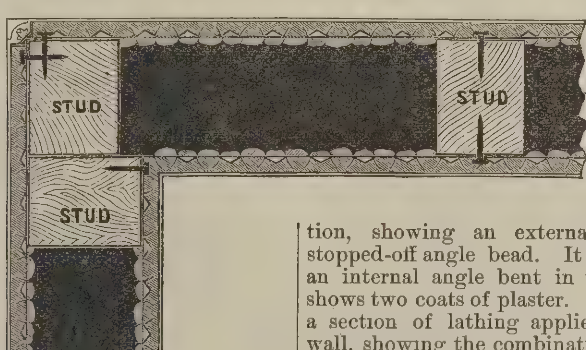


Fig. 18.—*Section of Lathing Applied to a Studded Partition.*

to. The lathing is secured to the frame by wire or suitable clamps. The plastering on both sides aids in binding the whole together, so that very substantial walls are the results. The sheet, punctured as above described, are furnished in plain iron dipped in a lime coating, or dipped in asphaltum, or galvanized. As lime is a well-known preservative of iron, it is claimed that plain iron with a coating of lime is the most advantageous to use. The merchantable size of the sheets is 30 x 96 inches. It is claimed that the labor in applying this material to the walls is very much less than what is required in putting in plaster, wooden lathing, and it is further claimed that the employment of this material greatly adds to the strength of the building, in the fact that it braces and stiffens the walls.

The tools required are a pair of shears, a special tool for forming the ribs and angles and a hammer. Fig. 18 shows a section of the lathing applied to a studded partition, showing an external angle with stopped-off angle bead. It also indicates an internal angle bent in the sheet, and shows two coats of plaster. Fig. 19 shows a section of lathing applied to a brick wall, showing the combination of lathing, furring and screeding; also an internal and external angle with stopped-off angle bead finished in two-coat work.

The American Frame Pulley.

We illustrate in Figs. 20 and 21 the American Frame Pulley, a new form now being put on the market by Palmer Hardware Mfg. Company, Troy, N. Y. Like their other styles of pulleys, it has its face edges curved to adapt it to fit a mortise made of a series of connected auger holes, and has markers on its edges with which to indent in the wood the exact centers on which to start the bit. The case is made up of a series of angular swellings, the apexes of which extend slightly beyond the curved lines of the face edges—the rear edge of the case being a hollow chisel. The manufacturers claim for this construction entire avoidance of the danger of splitting the jambs, as is likely to occur with those made to fill at all points a like mortise, on account of variation in position or inclination of the holes, which is unavoidable in those bored by hand. This improved

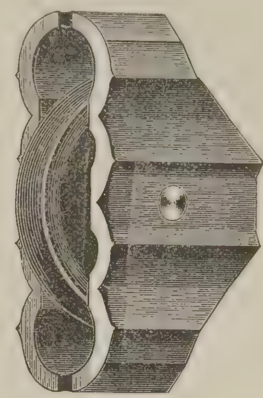


Fig. 20.—*The American Frame Pulley.*

form, it is claimed, will, by means of the rear chisel edges, cut away all obstructions caused by imperfect boring, and the apexes

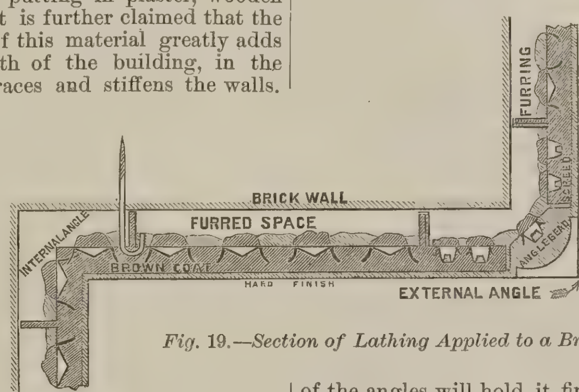


Fig. 19.—*Section of Lathing Applied to a Brick Wall.*

of the angles will hold it firmly in place. Its finish is referred to as being of the best. Only one size, 2 inches, is made. The pulleys have steel axles, and a ⅞-inch bit is used for mortising.

Power Mortising Machine.

Fig. 22 represents what is described in their circular as No. 2 patent power mortiser, put out by the Cordesman Machine Company, Butler street, near Pearl street, Cincinnati, Ohio. This is described as a new machine, and one which possesses many points of excellence. The machine is built wholly of iron and steel, and may

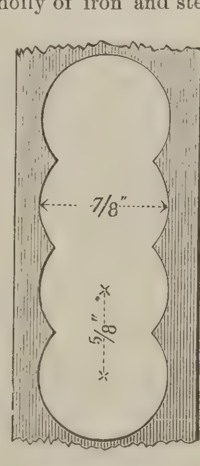
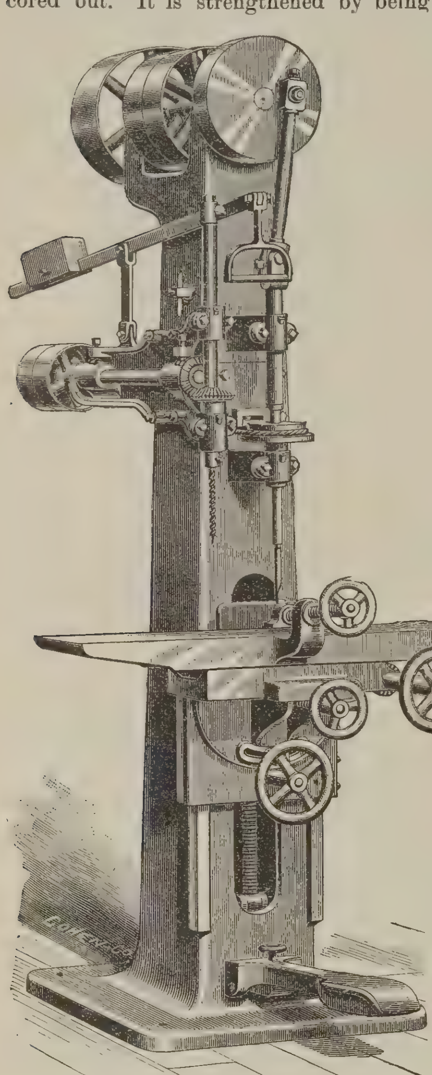


Fig. 21.—*Mortise for American Frame Pulley.*

be used on all kinds of hard or soft wood. It is designed to bore as well as mortise, and it has ample strength and durability for the purpose which it is intended to

serve. It works with great rapidity and accuracy, and is claimed to be just such a machine as would please the most fastidious. The column with its large base and crankshaft boxes are cast in one piece, cored out. It is strengthened by being



Novelties.—Fig. 22.—Power Mortising Machine, Manufactured by Cordesman Machine Co., Cincinnati, Ohio.

ribbed, and the iron is distributed in a manner to make it sufficiently stout to stand extreme jar and strain to which a machine of this kind is subject. The angling table can be adjusted to suit different thicknesses of material by means of the hand-wheel which operates the bevel gear and screws beneath. The material being worked is held securely in place by the hand-wheel provided for the purpose and the screw-clamp shown in the cut. The length to be mortised is fed laterally by the rack and pinion movement of the table. The work is raised to the chisel by means of the foot treadle, which can be so regulated as to stop the material in its upward movement at any desired point, thereby saving time and labor to the operator in making mortises of various kinds. The crank-wheel is described as being of extra large diameter, and with its connecting parts is carefully balanced. It is ground perfectly true and revolves in long boxes lined with genuine Babbitt metal. The boxes are placed on each side of the tight and loose pulleys and the caps are held down on the shaft by strong stud bolts with jamb nuts. The device for reversing the chisel while mortising is simple and almost noiseless in its operation. The thrust is direct from the crank-pin to the chisel, and there are but three joints between these points, thus avoiding much of the back lash which is usual in machines of this class. These joints are necessary for mortising and reversing the chisel at the same time. As the table drops for clearance the chisel reverses by a frictional belt, which is driven by power and thus requires no attention from the operator. The stop which releases and arrests the chisel does its work at the proper time and with the greatest promptness. The frame supporting the boring spindle has a planed tongue and is fitted to a planed groove in the main column. It is there held rigidly in line with the four bolts and is so arranged as to be kept in line with the chisel at all times. In boring the spindle is brought down by the lever shown in the cut, and it is returned to its place quickly by means of the balance weight. This attachment is provided with an adjustable gauge stop placed on one side of the column, by which the depth of holes can be regulated. The material being bored can be run under the chisel and mortised without being released from the bed.

Self-Setting Plane.

The Gage Tool Company, of Vineland, N. J., are directing the attention of the craft to the advantages possessed by their self-setting planes, a bottom view of one of which is presented Fig. 24 of the engravings. The tool has been on the market for nearly a year past, and has met with a very flattering reception. It is constructed with a bottom which is part iron and part wood. The dark portion of the engraving represents the ironwork forming the throat for the cutting blade and the self-setting arrangement, and is adjustable in every way. It is firmly anchored to the woodwork by a steel rod which passes through the plane from side to side, giving the solidity and durability of an iron plane without any of its disadvantages. In the manufacture of this plane the firm state that only the best material has been employed, particular attention being given to tempering, which secures a uniform quality. The company warrant their plane irons to withstand the hardest hemlock knot to the satisfaction of the user. The plane can be changed from single to double or *vice versa* in a very short time, giving a tool for rapid work and straight-grained wood, or one adapted for finishing and coarse-grained wood. It is stated that the wood stock of the tool is soaked with hot wax or oil.

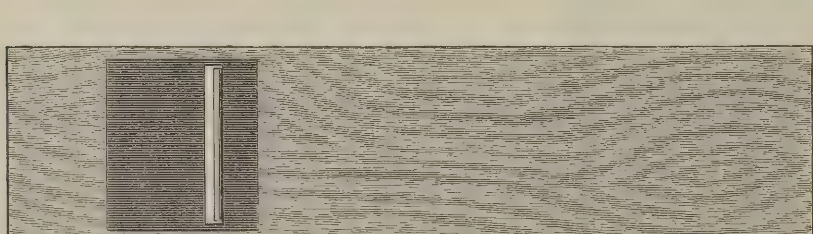


Fig. 23.—Self-Setting Plane.—Bottom View of Plane.

Combined Stove-Pipe and Ventilator

What is known as Ekstrom's Combined Stove-Pipe Thimble and Ventilator is being introduced by Cheney & Hewlett, 201 Broadway, New York. It is the first successful attempt, so far as our knowledge goes, of utilizing one flue for both smoke and ventilation purposes. How this is accomplished, is revealed in Figs. 24 to 26, inclusive, of the accompanying illustrations.

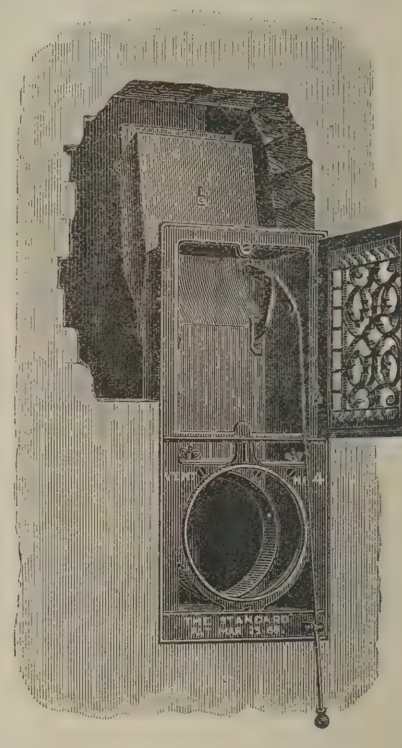


Fig. 24.—Combined Stove-Pipe Thimble and Ventilator.

The stove-pipe passes into the flue in the usual manner. The thimble is cast as a part of the ventilator, and is provided with means for holding the stove-pipe in place. Close inspection of Fig. 24 will reveal two thumb-nuts above the thimble. These are used to tighten a wire loop that extends down under the stove-pipe, and thus holds it in place. Above the stove-pipe a ventilator is provided, constructed register fashion, the register being in the form of a door, shown open in Fig. 24. This communicates with a pipe-shaped part, which extends upward into the flue, and which carries the vitiated air from the

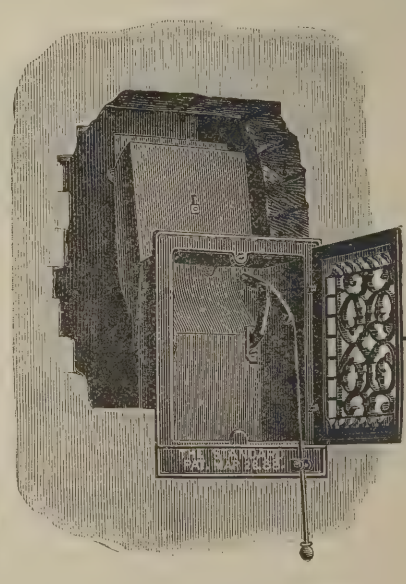
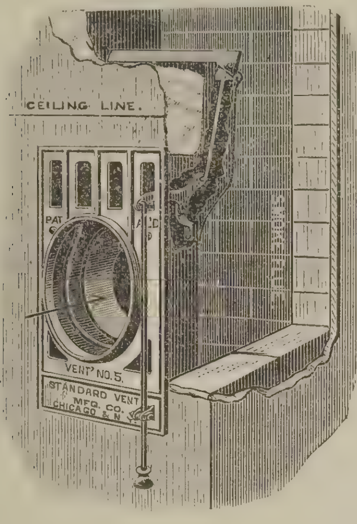


Fig. 25.—Base or Ceiling Ventilator.

room into the chimney flue, discharging it at a point so far above the smoke as to make it impossible for the smoke to return,



Novelties.—Fig. 26.—Kitchen Range Thimble and Ventilator.

while at the same time it gives the ascending column a certain degree of impetus.

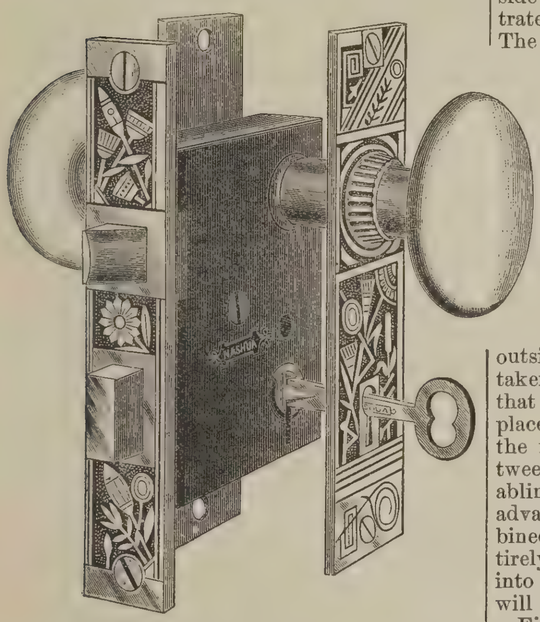


Fig. 27.—Nashua N. System of Knobs.

At the upper end of the ventilating duct is a valve which is operated by a bell-crank rod and handle, clearly shown in the figure. By this means it is possible to shut the ventilating draft entirely, when desired, and also avoid the annoyance of dirt coming into the room when anything is being done in the chimney, as, for example, cleaning the flue. Figs. 25 and 26 show modifications of the same general idea. Fig. 25 represents a base or ceiling ventilator constructed upon the same plan, omitting the thimble. This article is adapted for use in buildings where ventilators would be employed, but rendering it possible to utilize the one flue for the double purpose. It may be placed either at the base or ceiling, as desired. Fig. 26 shows the form of the article that is manufactured for kitchen ranges. In this the ventilating part is reduced to openings around the thimble, but, in other respects, the article is essentially the same. The general utility of this device will commend itself to our readers.

Improvement in Locks.

The Nashua Lock Co., Nashua, N. H., of whom C. F. Guyon & Co., 99 Reade street, New York, are agents, are calling attention to improvements which they have recently made in their line of locks. Among these they refer to the Nashua N. system of attaching spindles or knobs for use with roses only, or rose escutcheon combined; Nashua new steel swivel spindles, and reversible spindle hubs; reversible anti-friction latch, and K system of night work adjustment. We illustrate below two of these specialties. In addition to the customary methods of attaching knobs to spindles the company have perfected and applied for a patent on a plan of their own, which they designate as the N system. In this system the knobs are made with longer shanks than usual and are $\frac{11}{16}$-inch diameter, so as to go through the rose or rose and escutcheon combined, and rest on each side of the lock case. One knob being riveted to the spindle is intended to be used on the outside of the door. The other knob is fastened by a screw which goes through one side of the shank and through the spindle and is secured firmly by a thread cut in the other side of the shank. The N system is illustrated in the accompanying cut, Fig. 27. The N system of knobs for inside doors have $\frac{5}{16}$-inch straight spindles, while those designed for outside doors have $\frac{5}{16}$-inch swivel spindles, which are described as made so that they will work equally well in a solid hub. Among the advantages claimed for the N system are the following: That pulling on the knob made in this way has no tendency to separate or open the lock; that as one knob is always riveted to the spindle, such knob can always be on the outside and would preclude its being taken off and possibly the lock opened; that the N knobs can be kept in place without the least dependence on the roses, thus lessening the friction between knobs, shanks and roses, and enabling one to use roses only with equal advantage as rose and escutcheon combined, and that as the knob screws go entirely through one side of the shank and into the opposite side of the shank they will under no circumstances work loose.

Fig. 28 represents the new steel swivel spindle, $\frac{5}{16}$ inch, with reversible hub, which the company offer as an important improvement in front-door locks. The pin is to prevent any clandestine opening of the door from the outside by pushing

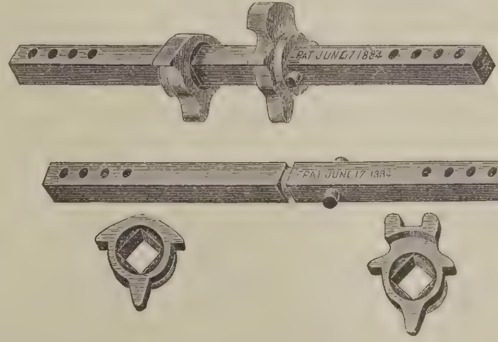


Fig. 28.—Steel Swivel Spindle 5-16 Inch, with Rev rsible Hub.

the spindle through the hub after removing the knob, as is liable to be done with the old-fashioned swivel spindle knobs. It is also to be noticed that locks supplied with this patent swivel-spindle hub are made reversible by turning over the latch bolt and both parts of the hub, and, the hub being made to fit $\frac{5}{16}$-inch spindles, enables the dealer to trim to suit his customers with any size of knobs he carries in stock. This is regarded as a feature of considerable importance, tending as it does to make an ordinary stock of locks and knobs more than usually available. Any of the company's knobs can be furnished with this new spindle.

TRADE NOTES.

Just as we go to press, and too late for review in the proper department in this issue of *Carpentry and Building*, we have received a copy of the second and revised edition of Monckton's Stair Building, containing an exposition of his one-plane method of handrailing. This book, in its first edition, our readers will remember, was reviewed some months since, and some extracts published. The present volume has all that the first contained, with some important additions. It is printed on alternate pages so as to permit its use in the form of plates if desired. The text faces the plates. A number of new designs are presented of finished stairwork, including iron stairs. Some of the latter are from the celebrated Hecla Architectural Iron Works, Paulson & Eager, proprietors, West Twenty-third street, New York. Other designs are from W. H. Hume, architect, No. 2 West Fourteenth street, New York. One plate in particular, being No. XVI in the book, will be studied with interest by many. It is the iron staircase being erected in the statue of Liberty, on Bedloe's Island, New York. This useful rather than ornamental structure is built around an iron column 18 inches in diameter, and over 100 feet high. It is planned a double staircase, one flight for ascending and the other for descending, and in the hight are 12 landings or platforms provided with seats. In all, there are 16 new plates in the work, and No. 34 has been changed.

Among the wood-working machines displayed at the Cincinnati Centennial Exposition that received first prizes are the Pryibil Twist Machines and Double Boring Machines, and the Dodd's Carving Machine. These machines attracted widespread notice, and the variety and quantity of work done on them has been pronounced by many of our readers, who have witnessed them in the exhibition referred to, as truly astonishing. The Cordesman Machine Company, of Cincinnati, in writing us upon this subject, say that the exhibition in question was the grandest, if not the greatest, exhibition of its kind ever made. The company named offer to give any information desired concerning the machines mentioned.

In another part of this issue the Stanley Rule and Level Company, of New Britain, Conn., advertise the Universal Hand Beader. This would seem to be well named, in view of the fact that it finds universal demand among wood-workers. We are informed that over 15,000 of this little device have already been sold. The facility with which a bead or molding can be put on curved work gives the tool great value, while for work like routering it certainly has no equal.

The Smith & Egge Company, of Bridgeport, Conn., state elsewhere in this issue that 10 years' use of the Giant Metal Sash Chain has demonstrated its practical merits. It is made of anti-friction bronze metal, and is in use in many of the public buildings throughout the country. This chain is claimed to be very durable and to give entire satisfaction in operation.

The Herbert Baker Foundry and Machine Works, of Toledo, Ohio, have just issued an interesting catalogue, of something over 60 pages, presenting illustrated descriptions of wood and iron-working machinery, engines, boilers, pumps, shafting, hangers, pulleys, emery wheels, planer knives, stave knives, saws, &c. The catalogue is neatly printed in a black ink shading on the blue, and is bound in colored paper covers of typographical design. In addition to what has been mentioned above will be found price lists of wood separable pulleys, circular saws, emery wheels, machine belting, with smooth metallic rubber surface, pulleys, post hangers, wall boxes, couplings, &c.

The Glen Cove Machine Company, of Brooklyn, N. Y., report the following recent sales and contracts: An outfit of planers and molders for the new mill of Brumley & Cutter; another heavy planer and matcher to John C. Orr & Co.; another molder to Cross, Austin & Co.; molder to Howard, Ivery & Shackleton; heavy planers, matchers and molders for new mill of Michael Solan; molder to the N. Y. Cedarware Company, all of Brooklyn, N. Y. Molder to the Knapp, Stout & Co. Company, Ft. Madison, Iowa; molder to the Williamsport Planing Mill Company, Williamsport, Pa.; molder to McGeragle Bros., Newark, N. J.; heavy planer and matcher to the T. W. Harvey Lumber Company; and a double decker flooring machine to the Soper Lumber Company, both

of Chicago, Ill.; heavy planer and matcher to Curphy & Mundy, Vicksburg, Miss.; heavy planer and matcher to A. H. Krouskop, Richland Center, Wis.; heavy planer and matcher to Wm. Kings' Company, Newark, N. J.; planers and matchers to T. G. Paterson; surfacer to L. H. Mace & Co., both of New York City; a double-decker to E. H. Barnes, president Seaboard Lumber Company, Shooter's Island, N.Y.; heavy planer and matcher to Dickison & Allen, Syracuse, N. Y.; heavy planer and matcher to California Lumber Company, Porter, Oregon; heavy planer and matcher to the Yesler Wood, Coal and Lumber Company, Seattle, W. T.

Messrs. J. A. Fay & Company of Cincinnati, Ohio, report their sales of wood-working machinery during the month of September as of a very satisfactory character. Among the contracts made was one which will probably rank among the largest ever given by an incorporated company. It called for the construction of something over 90 machines.

A superb catalogue of builders' hardware has been issued by A. G. Newman, 1180 Broadway, New York. The book is a large octavo, contains upward of 400 pages and is handsomely bound in cloth. The paper is excellent; the engravings are first-class and the display of text and illustration is upon a liberal scale throughout. This book has not been intended for general circulation, but those architects and builders who succeed in securing a copy will find much in it that they would hardly know how to get along without. The advantage of full size illustrations of locks, door trimmings, hinges, bolts, sash fixtures, &c., is apparent without discussion. The adaptability of the catalogue and its general utility are its strong features. Only a limited edition of the work has been published, and in its distribution we are informed it will be sent to those who are in position to make good use of it. The book is accompanied by a price list arranged numerically, and in all respects the volume is a handsome addition to the library of an architect or contracting builder.

The Calumet Iron and Steel Company, of Chicago, illustrate in their card in another part of this issue the relative advantages of the C. P. C. nail. It is claimed to have the best shape, secure the strongest hold, to be the easiest to drive and at the same time the lightest nail of any in the market. It is said to run the same number of nails to the pound as the wire nail. It may be described as a parallel, chisel-pointed steel nail.

D. Hepp, Hecla, Dakota, directs attention in another part of this issue to his Builders' Calculator, which is described as a dimension reckoner. Various rules and methods are embodied in this work to make it of interest to the trade.

The Pennington Machine Works, Fort Wayne, Ind., have been reorganized, and in future will be known as the Indiana Machine Works, with the following list of officers: J. C. Peters, president; P. A. Randall, vice-president; E. H. McDonald, secretary, and J. M. Landerberger, treasurer and manager. The new company have erected for their special use a new factory building, 44 x 160 feet in size and two stories high, with two additions, a store-room 25 x 32 feet; engine-room, 25 x 32 feet, the latter one story in hight; blacksmith shop, 22 x 35 feet; warehouse building, 35 x 100 feet, two stories in hight, and an office building, 16 x 32 feet. The company have abandoned all the old patterns of wood-working machinery formerly made by their predecessors, and are actively engaged in the production of patterns for a full line of new and improved machinery designed to be first-class in every respect.

Merchant & Co., with principal office at Philadelphia, and branch offices in New York and Chicago, present in succinct form in another part of this issue the general conditions under which their celebrated brand, Camaret Roofing Plates, is put upon the market. Those of our readers who have occasion to use tin plates will find the statement of interest to them.

Samples on Wood and circulars descriptive of creosote wood stains for shingles, fences, clapboards, &c., are offered to the trade by Samuel Cabot, 70 Kilby street, Boston, Mass. These articles have been on the market for some time past and have an enviable reputation.

We have received from the Egan Company, of Cincinnati, Ohio, a copy of an illustrated and descriptive catalogue of wood-working machinery which the company have just brought out. It is a volume of nearly 200 pages, profusely illustrated with engravings of an extensive variety of wood-working machines, and is bound in flexible board covers. The company announce that as their business has increased from year to year they have added to their facilities the most improved tools of the very latest design, and assert with confidence that they are now better prepared than ever before to produce first-class machines. They state that they have machines of some description running in every State in the Union, and in nearly every country in the world. They possess facilities of such a character as enable them to equip on short notice furniture or chair factories, planing mills, buggy or wagon factories, car shops, bracket or fancy cabinet shops and general jobbing and wood-working shops. In addition to the interesting descriptive text the catalogue contains tables of prices and dimensions of various parts, rules for calculating the speed of drums or pulleys, price list of tight and loose pulleys and cast-iron pulleys, together with a vast amount of information which will be found of interest and value to those engaged in the wood-working business. The closing pages of the work present illustrations of a variety of molding cutters, which are constructed of the best cast steel; patent solid milled cutters for flooring, ceiling, sash, &c.; patent edge molding cutters; a number of patterns of edge molding cutters; a price list of solid milled friezing cutters with ¾-inch hole or under, and a comprehensive index. We understand that only a limited edition of this catalogue has been prepared, and that it is not intended for general distribution in the trade.

Frank & Co., 176 Terrace street, Buffalo, N. Y., present in another part of this issue illustrations of several of their styles of wood-working machines, and invite the trade generally to send for their illustrated catalogue, describing their entire line. They offer complete outfits of machinery for wood-working establishments, supplied on short notice.

We have received from the Herendeen Mfg. Company, Geneva, N. Y., a copy of their catalogue of the Furman Steam Heater, which is described as a low-pressure boiler for warming all kinds of buildings. The pamphlet is tasteful in get-up, the illustrations are numerous and carefully engraved, while the text and letter-press are very complete and well arranged. The general subject is carefully presented and some useful directions are given with reference to estimates and other particulars. A considerable portion of the book is devoted to testimonials. We have also received from the same company a pamphlet, entitled, "Modern Greenhouse Heating," being an essay on greenhouse heating, with measurements for steam-piping. This book makes use of the same illustrations as are employed in the other. The subject is of interest to all who have to do with warming buildings or constructing greenhouses.

A very interesting circular on the adjustment of circular saws was issued by Peter Gerlach & Co., of Cleveland, Ohio, bearing date October 1. It is addressed to mill owners, sawyers, and it is of a kind to be of advantage to all users of saws of whatever character. We understand that copies will be sent to all applicants.

Mr. John Grossius, of Cincinnati, Ohio, by means of an attractive circular, is directing the attention of architects, builders, and all who are in need of heating apparatus, to his No. 66 Improved Down-Draft Furnace, adapted for the exclusive use of anthracite coal and coke. This construction, it is claimed, is particularly adapted for large residences or other buildings, as it has a capacity sufficient to maintain at all times a comfortable temperature. In the circular which Mr. Grossius has issued, devoted to an illustrated description of this furnace, a list of names is presented, showing a few of those who have employed the hard coal pattern of heater. This circular also calls attention to an improved laundry drying closet, constructed of brick, which is designed for rapidly drying clothes. Special precaution is taken in the construction of this device against fire, and it is provided with a wire screen on the inside near the bottom, designed to prevent the clothes from coming in contact with the heating pipes.

Chas. A. Strelinger & Co., direct attention in another part of this issue to Moore's auger bit files, for which strong claims are made. A special offer which they are making to the trade will remain in effect until December 1 of the present year. The goods are well spoken of, and an opportunity is offered of securing samples at very reasonable figures.

The Peerless Mfg. Company, of Louisville, Ky, send us an exceedingly interesting pamphlet containing a number of colored engravings of artistic English open fire-places. The company state that they began the manufacture of goods combining the English style and appearance last year as an experiment, but the success of the venture has been such that they have been encouraged to give the matter further time and attention, and are now prepared as a result of their labors to offer the trade an interesting assortment of English Tile Grates or open fire-places. The catalogue before us presents a number of styles which are now ready and to which additions will be made from time to time. In order to assist the trade and properly show the appearance of the goods, the different kinds of electro-plating are represented in the engravings by their appropriate colors. Twelve sheets of engravings are contained in the catalogue, executed in bold and striking designs.

Herbert Baker, 100 Erie street, Toledo, Ohio, is producing machinery for pattern shops, planing mills, sash, door and blind factories, &c. His card will be found in another part of this issue.

A descriptive catalogue and price list for 1888 has just been issued by Dietz, Woermann & Co., of Cincinnati, consisting of 40 pages of letter-press, illustrated with well-executed engavings of wood-working machinery, shafting, hangers and pulleys. The work presents illustrated description of several new machines brought out by the company, among the number being a new 24-inch pony planer; a new style 9-inch molding machine, capable of cutting any kind of molding not exceeding 9 inches in width and 4 inches in depth; an improved band-saw; a new improved band-sawing machine, adapted to do all kinds of light and heavy work; a new scroll saw, with patent loose pulley; a new adjustable rip and cross-cut saw, with boring and jointing attachment; wood-turners' lathe and new style power mortiser. Illustrations are also presented of grindstone mandrels, patent saw arbors and emery grinders. Several pages are devoted to tables giving dimensions and prices of various goods manufactured by the company, which will be found of interest and value to those using wood-working machinery. In addition to what has already been mentioned are rules for calculating the speed of saws, pulleys and the like. The third page of the cover is devoted to an index alphabetically arranged by subjects. The work, as a whole, is of neat and of tasteful appearance, and is issued to the trade in a form to invite attention.

J. E. Bolles & Co., Detroit, Mich., inform architects and builders that they make a specialty of all kinds of ironwork for buildings, including iron columns, lintels, stairs, balconies, &c.; wrought-iron grills, jail work, wire railings and fencing; roof crestings, stable fittings, &c. They invite the trade generally to send for their illustrated catalogue.

Erskine W. Fisher, 18 Broadway, New York, is directing attention to Francestown Soapstone Hard Finish for plastering. This is claimed to be the hardest, smoothest and most economical finish in the market. Samples, we understand, can be secured upon application.

I. P. Frink, the well-known inventor and manufacturer of Frink's improved ventilators for churches and other buildings, sends us a copy of a letter received a short time since from the Building Committee of the West Harlem M. E Church concerning the reflecting chandelier made from special designs for this structure and put in place by Mr. Frink a few months since. The key to the entire communication is given in a single quotation. They assert that the work is simply grand, and continue: "It is so neat, chaste and graceful in design that it commands the attention and elicits favorable comments from every one who views it. It lights our main audience-room abundantly with as pleasant a light as it seems to us possible to produce."

The United States Mineral Wool Company, of No. 2 Cortlandt street, New York City, advise us, under recent date, that they have lately supplied their material to the Atlantic Automatic Refrigerating Company, of Atlanta, Ga., and the Macon Refrigerating Company, of Macon, Ga., the mineral wool to be used in filling the floors and walls of the buildings occupied by them. They also inform us that they supplied material for deadening the floors of the Mary Willis Library, located at Washington, Ga.

A letter received from the Gage Tool Company, of Vineland, N. J., calls attention to a slight error in our reference to them, which appeared in the October number. In that issue, we stated that, while making a boring in the earth, they encountered wood at a depth of 185 feet. In this the statement is in error, in that the company referred to did not make the boring, but their representatives were present at the boring which was being made at that place. We understand Messrs. Kimball, Prince & Co., of that place, were boring with the object of securing water which will corrode their boilers less rapidly than that used heretofore.

The Goulds Mfg. Company, 28 to 38 Ovid street, Seneca Falls, N. Y., ask the trade to send for their new No. 20 catalogue, which has just been received from the press, and which is described as the handsomest and most complete pump catalogue ever published. This is the 27th edition of the book referred to. A *fac simile* of the cover page appears in their advertisement in another part of this issue.

We have received from the Lincoln Iron Works, of Rutland, Vt., a very attractively arranged catalogue of machinery designed for working and handling stone and marble. The pamphlet is oblong in shape, and consists of 52 pages of letter-press, printed in plain black upon a fine quality of calendered paper. Numerous illustrations are presented, showing general views of the machines manufactured by the company, together with tables relative to the size, weight and strength of standard hoisting ropes made of iron and steel; also other tables, which will be found useful in this connection. The closing pages are devoted to a list of concerns which have used the company's goods. The catalogue is attractively printed, and, in the arrangement of the matter, gives evidence of much care and attention on the part of those having the work in charge.

The Cincinnati Corrugating Company, 147 Eggleston avenue, Cincinnati, Ohio, refer in their card, which appears in another part of this issue, to the scarcity of iron and steel sheets for roofing purposes. They say that, notwithstanding that stock is difficult to get from the mills, they have an assorted stock of over 100 tons, and that they are therefore able to supply buyers at short notice.

Those of our readers who are willing to assist in promoting the circulation of *Carpentry and Building* are invited to correspond with us. We have ready an attractive offer which will prove very interesting to all who have a little time to devote to the work. The prominence that will be given to low-cost houses for the ensuing year, which is partly set forth in our Building Association Competitions, elsewhere announced in this issue, will greatly increase the field of the paper the country over. Local canvassers and organizers of clubs should profit by this. If you are disposed to engage in the work, write us.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME X. NEW YORK, DECEMBER, 1888. NUMBER 12

NOTES AND COMMENTS.

THE EDITOR of *Carpentry and Building* desires to ask a favor from his readers at large. In formulating plans for the new year, and in making arrangements for various articles to be published in the next volume, he desires to know the wants and wishes of his readers, and he thinks this can be best accomplished by asking them to write him just what they think of the paper as it is at present conducted. Letters that are critical and point out things that might be advantageously changed will be welcome, while those which indicate satisfaction with the paper as it is at present will, of course, be acceptable. What the Editor wants is a letter from every reader from one end of the country to the other answering this general question, "How do you like *Carpentry and Building*?" and naming incidentally any changes that it would seem expedient to make in the conduct of the paper and selection of matter printed in it.

WE HAVE DECIDED to extend the time in our Building Association Competitions, the announcement of which appeared in our November number. By reference to the conditions and general particulars, which are published in full on another page of this issue, it will be noticed that the time in each of these contests, instead of being December 31, has been made January 31. It has been urged by several, who propose to compete, that with the closing up of work for the year, and with the holiday season, which always interrupts work more or less, the last day of the year is an unfortunate time to close the competitions, and that the interests of the readers, as well as the competitors, would be better served by making the time a little later. Accordingly, we announce the postponement mentioned above, which certainly will come to the notice of our readers in general before they have taken any important action in the matter.

IN THE LAST ISSUE of *Carpentry and Building* we announced our Building Association Competitions, and in this column stated the prizes correctly—namely: First prize in each of the contests, $100, and second prize in each of the contests, $75, and making a total of $175 in each competition, or $350 prizes money in the two. By a singular mistake, in the formal announcement of the competitions in our advertising pages, the second prizes were printed at $50 each. The head line at the top of the page, on the other hand, indicated a total of $350. This discrepancy has naturally caused some inquiry, to which we have replied by letter. It is fortunate that the larger sums happen to be the correct ones; otherwise some of those whose attention had been drawn to the competitions by reason of the two large prizes in each would have been disappointed when the correct amounts came to be named.

JUST AS WE go to press with this issue, but too late to admit a report of the meeting, there is assembled at Chicago the Western Association of Architects. This is the fifth annual convention of this organization. The call was for a meeting commencing November 21 and ending November 23. One of the most important measures to come before the convention is the proposed consolidation with the American Institute of Architects. It seems to us that anybody who gives the matter any thought at all must recognize the eminent desirability of a consolidation or confederation of all the architectural societies of this country. There are no interests served by a number of societies that would not be better served by one strong, influential body, embracing in its ranks, as near as possible, all the reputable practitioners of architecture in the nation. Such an organization would have also the advantage of revenue sufficient to establish a bureau of general professional information and legal advice for all its members, and would form a body powerful enough to make its influence felt in the formation and passing of building laws and in the policy of municipal and general government buildings. Our readers, who are for the most part builders, will certainly see the desirability of the architectural profession in this country being gathered in a strong association in the way we have outlined above. In the same sense they will see the advantages of the builders forming themselves into a national association, which, in a measure, has already been accomplished. When the builders, on the one hand, are represented by an association which will act for their interests collectively, and the architects, on the other hand, are gathered into an association which will stand for their side of any controversy, there will be the opportunity of treating one with the other in a way to secure better building practice, better building laws, and a better understanding in general in all directions than exist at present. We hope the Western Association of Architects will not pass this opportunity by, of falling in with a plan that certainly will be advantageous to the building interest of the country, as well as to architects in particular.

OUR WESTERN contemporary, the *Sanitary News*, has published the opinions of a number of prominent Chicago plumbers on the respective merits of lead and galvanized pipe for water service. It is quite remarkable that nearly all of the opinions expressed coincide in favor of lead pipe. The first reason given is that the water passing through the pipe forms an insoluble coating on the interior which protects the lead from further corrosion, and, furthermore, does not contaminate the water in any way. The greater ease with which it can be manipulated and put in position are also the subjects of remark; while more important than those, the ease of repairing is referred to. In case a lead pipe bursts, a joint can be wiped around it with little trouble and expense; while, on the other hand, if galvanized iron pipe is injured, the entire section must be taken out, or else the damaged place must be sawed off and replaced with a new piece of pipe. All these statements are sensible, and we have no doubt, for the conditions prevailing in Chicago, that lead pipe is preferable to galvanized iron, and is a safe water conduit. To avoid giving a wrong impression, however, it should have been noted that the safety of lead pipe is altogether dependent upon the quality of the water. This is a subject which has been often noted in our columns and elsewhere, but it nevertheless escapes attention too frequently. There are certain drinking waters containing lime which, when passed through lead pipe, form an insoluble salt that serves as a perfect protection against further corrosion; but, on the other hand, there are many other waters, either pure or containing small percentages of nitrogenous compounds, which will very rapidly corrode lead and give rise to lead poisoning. Galvanized iron, however, is no better than lead in this respect. It should always be carefully determined whether the water will form a protective coating before lead is used in any place where there will be danger of it poisoning water which is used for drinking and culinary purposes.

REFERENCE WAS MADE in these columns last month to a series of experiments that had been made in Austria with a view to acquiring practical information on the subject of theater fires. The results showed that large ventilating shafts over the stage were of the greatest advantage, and we mentioned at the time that the building laws of New York in the provision for stage ventilation accorded with these recommendations. The law bearing on the point in question is as follows: "A shaft or shafts shall be provided over the stage, to and out of the roof, made of fireproof materials throughout, and of an area or combined area of at least one-eighth of said stage, fitted up with skylights having sliding sash and glazed with double thick sheet glass, not exceeding ⅛ inch thick, and each pane measuring not less than 300 square inches, and the whole of which skylights shall be so constructed as to open instantly on the cutting or burning of a

hempen cord which shall be arranged to hold said skylights closed, or some other equally simple approved device for opening them may be provided." It is satisfactory to note that in the matter of legal requirements the municipal authorities have been wise or fortunate enough to frame their laws in agreement with the results of scientific inquiry, and it is fair to suppose that these same laws will be amended just as often as an increase of knowledge reveals their imperfections.

COULD OUR REMOTE ancestors have foreseen the quantity of legal safeguards that would be established for the protection of the lives and property of their children they would have died in the full hope that fatal and disastrous fires would be unknown to the coming generations. What is theoretically true, however, is often far different from existing facts, and while the law has done all within its power to guard against conflagrations, the loss of life and property by fire is and will be a frequent occurrence. If a city government could but collect together, or manufacture a fund of "presence of mind," and distribute it every winter to the sight-seers, there would be very few lives lost in burning theaters. A cool-headed audience can get out of a theater in a very little time, and long before the flames would spread from the stage to the auditorium. But when we consider the mental equilibrium of the average citizen in time of danger, we are forced to the conclusion that the only efficient fire-escape is the system devised last year by a certain wise humorist who proposed to build a separate chute from every theater chair to the street, so that by touching a button the audience would on the instant be emptied out of doors. This, however, is a scheme that needs development in some of its working details, and, until it is ready for use, it is well to provide every other possible means against the starting and spreading of fires.

NOT A LITTLE ingenuity has been expended of late years in discovering the numberless possible causes of death and disease which our ancestors were unconscious of, whether happily or unhappily we do not pretend to say. Air and water, which the ancients ignorantly took as symbols of life and purity, are now known to be the greatest enemies of the human race. The atmosphere, according to the researches of modern science, is alive with little latent sicknesses, and every spring and watercourse is teeming with fearful microbes. However, we somehow manage to live, even though it be in a state of constant fright. If it were the quacks alone who tried to scare us with all these surrounding evils we might afford to laugh at their statements, but unfortunately it is the authorities in several branches of science who warn us of dangers and keep us low-heated every time we drink or breathe. Not long ago the popular mind was diverted from the traveling disease germ to the stationary dyestuff poison, and instead of biological analyses of air and water the laboratories were kept busy applying the arsenic test to stockings and other articles of clothing, while occasionally a wall paper was submitted for chemical analyses by some cautious householder. The newspaper agitation on the subject and the action that followed did really have a good deal of effect in preventing the use of arsenic for a coloring agent where there was danger of its working injury.

THE PRACTICE, however, has not stopped entirely according to a writer in one of the leading chemical journals, who has lately examined some green printed wall papers. A new point, however, that he makes is, that it is not the green colors known to be made from arsenic that alone are dangerous, but also the metallic colors having a copper base, the explanation being that the copper out of which the colors were manufactured often contained a considerable amount of arsenic, one instance being cited of a sample of copper wire which was found to carry 5 per cent, of metallic arsenic. We have no wish to disparage the many real dangers to life and health about which we ought to be reasonably careful, but we must enter a protest against fanciful evils that are being constantly added to the large enough sum of real ones. Arsenical colors are very likely dangerous things to have about and so would copper colors be if they contained much arsenic. But the writer above quoted bases his conclusions on an analysis of copper wire, which he said contained 5 per cent. of arsenic, a statement which carries absurdity on its face, seeing that a fraction of 1 per cent. of arsenic will render copper utterly unfit for working. An enthusiast is a good thing once in a while, and every reformer must be something of a fanatic, but willful or ignorant misrepresentation will never accomplish any benefit, while it may do a great deal of harm.

THE NATIONAL EXPOSITION at Augusta, Ga., for which extensive preparations had been made, opened auspiciously on the 8th ult., and all the arrangements are now complete. The exposition building has a floor space of 7 acres, and is 900 feet long by 100 feet wide, with three cross sections, respectively 200, 300, and 400 feet deep. Besides space for exhibits it accommodates 15,000 visitors, and has over 2 miles of frontage in aisles. The oration was delivered by the Hon. James C. Black, a leading lawyer of Augusta. In the course of his address he called attention to the fact that Augusta had water-power equal to 14,000 horse-power; that her factories turn 200,000 spindles and employ 5000 hands; that they pay $1,000,000 in annual wages, and that their product reaches $5,000,000. He said the property of Georgia had increased in the last ten years over $103,000,000, exclusive of railroad property, while railroad property had increased $20,000,000, or 212 per cent. The property owned by colored people, he said, was in round numbers $10,000,000, an increase in ten years of 85 per cent.

THE BUILDERS' EXCHANGE of Pittsburgh has appointed a committee for the purpose of selecting a site for the erection of an exchange, to cost in the vicinity of $200,000. The building will be modeled after the plan of the Philadelphia, Boston and Chicago Exchanges. The basement will contain a trades school for the education of boys to be carpenters, painters, masons, bricklayers and all the arts appertaining to the building trades. The first floor will be a bank for the benefit of contractors, builders and architects. The second floor will be the exchange proper, where contractors and architects can meet and make agreements, and where property owners can come and see about the erection of buildings. The third floor will be for the meetings of the exchange.

THE PLATES.

In Plate XLV we show a design of wall-paper, which has been described by one of our English art exchanges as a "free classic decoration." Our contemporary says that a free treatment has been adopted in this design for wall-paper to meet the demand felt for a decoration suited to the requirements of the prevailing style in architecture. A broad, flat, decorative effect is obtained by simple means, and in keeping with the characteristic forms used in the carved and ornamented work of free classic buildings. The design in question was prepared by Mr. Hampden W. Pratt, a Fellow of the Royal Institute of British Architects. The hangings printed to this design are manufactured by Jeffrey & Co., of Islington. With reference to colors, we are informed that a series of ten different colorings have been prepared, and also ceiling patterns of a similar character. No doubt the equivalent will soon be produced in this country. This design has attracted marked attention on the other side of the water, and will no doubt prove interesting to many of our readers.

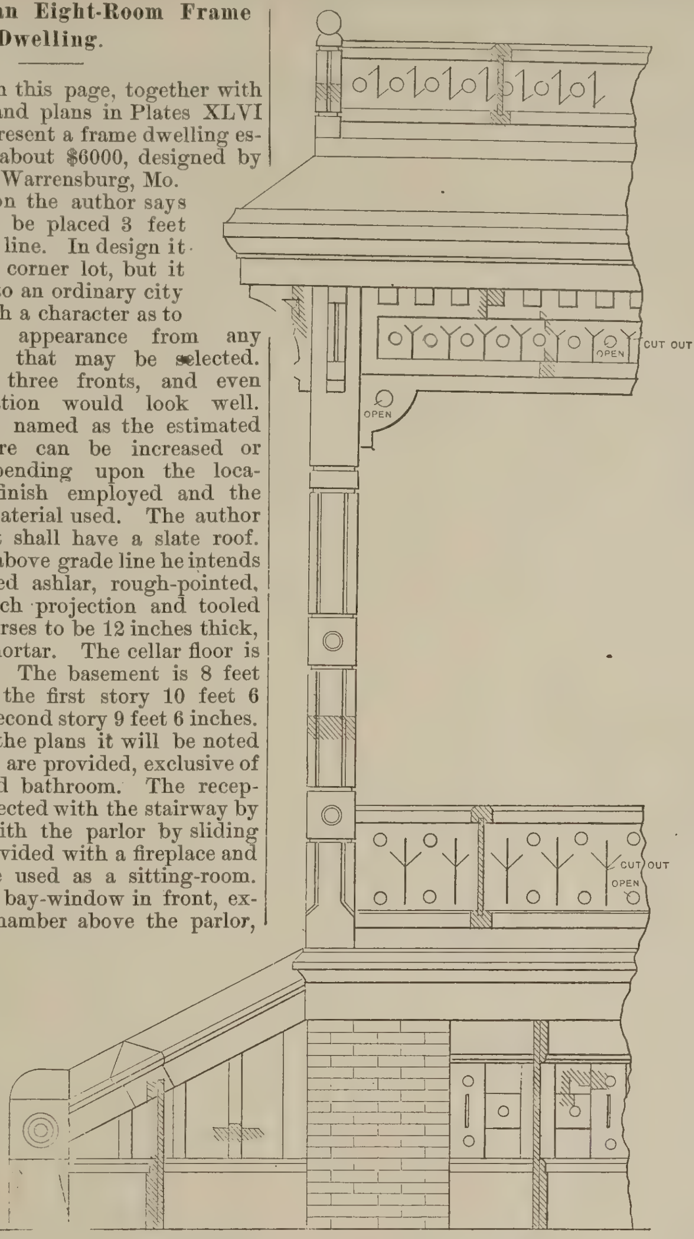
We present in Plates XLVI and XLVII the elevations and floor plans, of an eight-room house, designed by W. G. Mumma, Warrensburg, Mo., an architect whose work has already been before our readers. In the text pages will also be found a selection of details. A glance at the floor plans will show that the rooms are capacious, and that due care in providing spaces for furniture, and securing convenience in arrangement, has been exercised by the designer. Entering the house from the veranda the visitor passes into a capacious reception hall. It is lighted by three windows, and cheered by an open fire. At the right is the parlor, while directly in front is the staircase. Opening out of this to the right is the dining-room. From the dining-room to the kitchen communication is through a closet, giving two doors in the usual style. The back stairs open out of the kitchen and along the side of the principal stairs from the front. A roomy pantry is secured in the space opposite the china closet. Four good chambers are provided on the upper floor, in each of which is a wardrobe or closet. Open fireplaces are secured in two of them, while the third has a place for a stove. The bathroom is located directly over the pantry in the lower floor, and in a way to bring the plumbing central and in close communication with the kitchen. Other features will be apparent on even casual examination.

In Plate XLVIII is presented a carved chimneypiece in the English style, representing work of the eighteenth century.

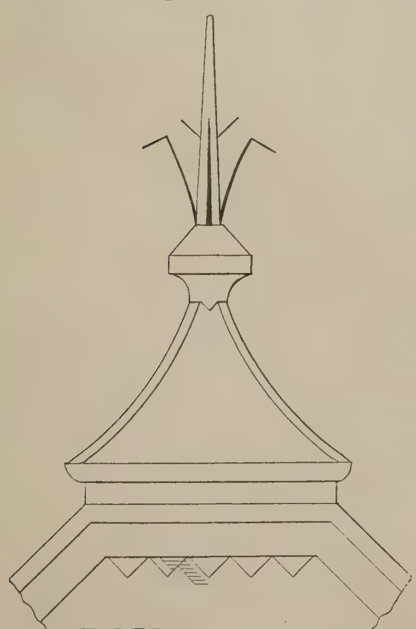
ROME, AS IT WAS rebuilt after the great conflagration in the reign of Nero, was literally a city of tiles. The walls were built of concrete or of adobes heavily plastered with stucco on the outside, which was covered with tiles 18 or 20 inches square and about 1¼ inches thick. These were made to adhere firmly to the fresh stucco. Heavy walls of good material put up in this manner were durable, and were good non-conductors of heat and sound—qualities which admirably adapted them for residences.

Design for an Eight-Room Frame Dwelling.

The details on this page, together with the elevations and plans in Plates XLVI and XLVII, represent a frame dwelling estimated to cost about $6000, designed by W. G. Mumma, Warrensburg, Mo. In his description the author says the house is to be placed 3 feet above the grade line. In design it is suitable for a corner lot, but it can be adapted to an ordinary city lot. It is of such a character as to have a good appearance from any point of view that may be selected. It might have three fronts, and even the rear elevation would look well. While $6000 is named as the estimated cost, this figure can be increased or diminished—depending upon the location, style of finish employed and the quality of the material used. The author proposes that it shall have a slate roof. The foundation above grade line he intends to be of coursed ashlar, rough-pointed, with about ¾-inch projection and tooled edges. The courses to be 12 inches thick, laid in cement mortar. The cellar floor is to be concreted. The basement is 8 feet from the floor; the first story 10 feet 6 inches and the second story 9 feet 6 inches. By reference to the plans it will be noted that eight rooms are provided, exclusive of halls, pantry and bathroom. The reception hall is connected with the stairway by an arch; also with the parlor by sliding doors. It is provided with a fireplace and is intended to be used as a sitting-room. The parlor has a bay-window in front, extending to the chamber above the parlor, terminating with a gable in the main roof. The dining-room is connected with the kitchen through the china closet. A dumb-waiter is placed in the china closet which runs from the basement to the second floor. The rear veranda is connected with both dining-room and kitchen. The bathroom is placed above the pantry. The laundry is below the kitchen. The rear stairway starts from the kitchen and the cellar steps start from the pantry under the rear stairway. Some of the chambers are provided with closets and others with wardrobes built in. The chimneys are to be topped out with dark-red brick (pressed) with stone and terra-cotta caps. Transoms are to be provided to all doors on the first floor. The main stairway has a platform with a newel post starting from it. The railing is to be returned on the second floor, as indicated in the plan.



Details of Eight-Room Frame House.—(See Plates XLVI and XLVII for Elevations and Plans.)—Front Veranda.—Scale, ⅜ Inch to the Foot.



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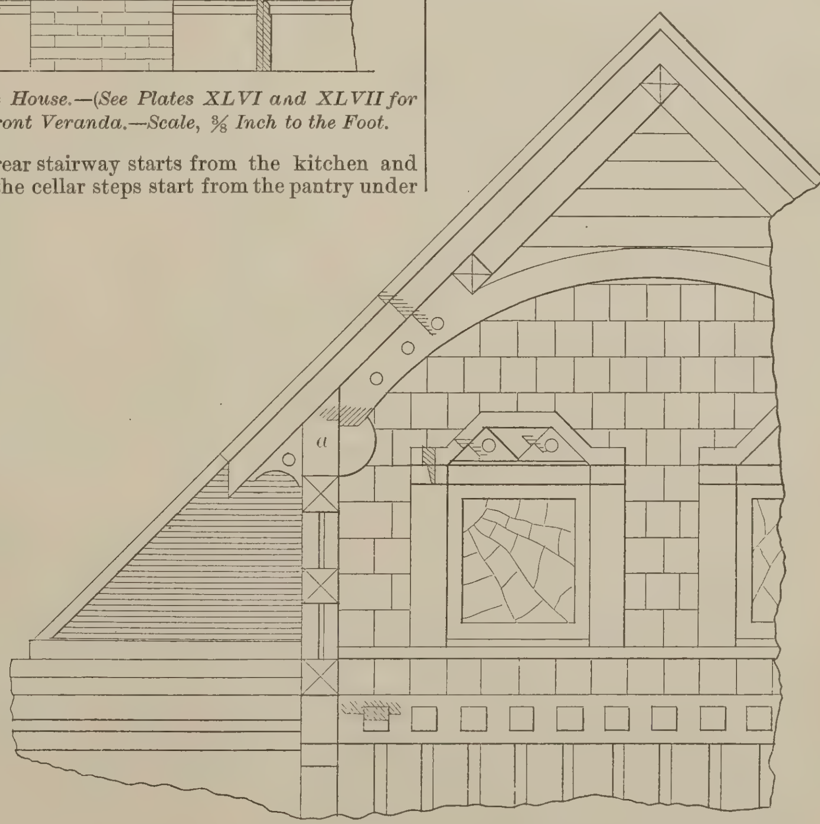
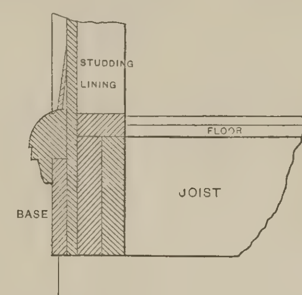


Gable Shown in Front Elevation.—Scale, ⅜ Inch to the Foot.

A FEATURE OF THE Paris Exposition of 1889 will be a collection of buildings illustrating different periods in the history of architecture. The exhibit will consist of structures typical of the dwellings in vogue at various periods of time, and will afford an excellent opportunity for a study of the progress of architecture. Among the



Section through Base and Sill.

buildings now in process of erection are those illustrating the time of the Lake dwellers, Etruscans, Persians, Chinese, Aztecs, Egyptians, Russians and of the Byzantine order.

A GERMAN TRADE JOURNAL advocates a peculiar method for testing the quality of roofing slate. The samples of the slate to be tested should be carefully weighed and then put into boiling water for a quarter of an hour. The water must, however, be fairly free from lime, saltpeter and ammonia. The slates are then reweighed, and those that show the greatest increase in weight are those most capable of resisting deterioration.

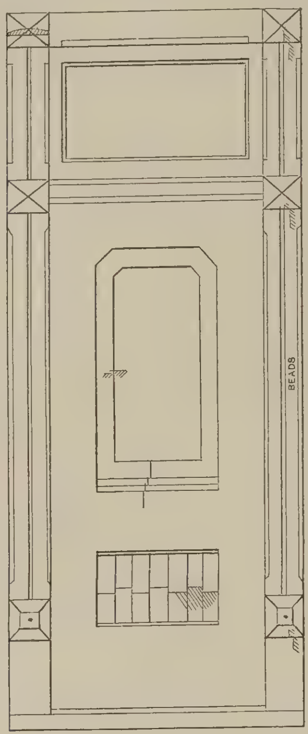
Masonry.

Masonry and Stone Cutting.

(Continued from page 208, October.)

Templet for Marking the Heading Joints on the Soffit.—This is simply a rectangular piece of zinc cut to the soffit of an arch stone, as shown in development (Fig. 41).

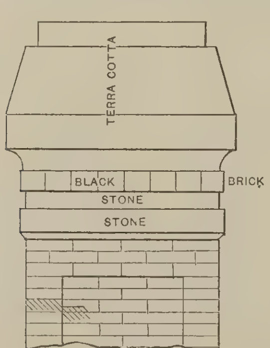
Arch Square.—The arch square required for working the soffit from the bed



Details of Eight-room Frame House. (See Plates XLVI and XLVII for Elevations and Plans.)—Front Door.—Scale, ⅜ Inch to the Foot.

is composed of an arc of the square section of the arc and a straight arm perpendicular to it

Method of Working the Voussoirs, First Bed.—Bring one side of the stone to a plane surface. With No. 1 draw on it the curve of the intradosal coursing joint, A B C (Fig. 45). With No. 2 draw one of the heading joints, as A E (Fig. 45). Take the twisting rules, and, applying the parallel rule to the line just drawn, work



Chimney Top.—Scale, ⅜ Inch to the Foot.

the bed to the proper twist. With No. 2 draw the second heading joint. This completes one bed.

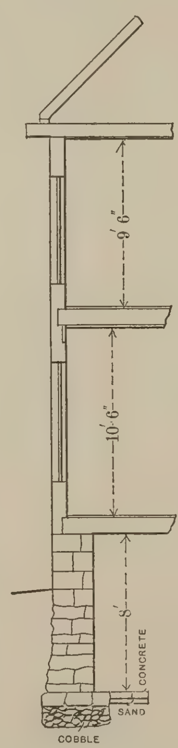
Soffit.—With the arch square applied so that it shall be always in a plane perpendicular to the axis of the cylinder, work the soffit to a cylindrical surface. To give the arch square its proper direction apply a small bevel to the soffit set to the complement of the angle of intrados, as *a* B (Fig. 41). With No. 3 gauge the soffit to its proper width, and mark the heading joints. This completes the soffit.

Second Bed.—This is worked from the soffit with the arch square and the heading joints drawn with No. 2.

Bracket at a in Front Gable (see preceding page).

Ends.—These are worked with a straight-edge applied between the joint lines drawn on the beds with No. 2.

In large arches, say of above 50 feet span, the drawing of the developments of the soffit and extrados full size is highly

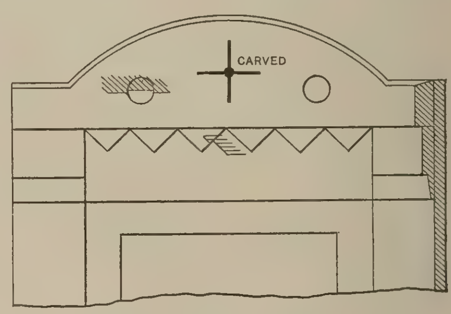


Section Showing Hight of Stories.

inconvenient, and it is preferable to find all the templets for working the stone by trigonometrical calculations. The formulæ for this purpose are to be found in "Dobson's Treatise of Masonry," as well as further practical developments on the art of constructing skew arches, and to this work we beg to refer those of our readers who are particularly interested in this kind of structure.

To Construct a Splayed Back-Vaulting to a Semi-Circular Archway so as to Allow Opening a Circular-Headed Door. — This kind of finish to doorways, called by French masons a *Marseilles back-vaulting*, resembles in its principle of construction the cow's-horn arch. In its plan (Fig 47) A′ B′ is the outside face of the wall and E′ F′ is the inside. A′ A″ is the reveal of the semi-circular arch; C′ C″ is the rebate to receive the leaves of the door; it is semi-circular, like the arch; C′ E″ is the splay to receive the leaf of the door when open. The surface between the two splayed jambs C′ E′ and D′ F′ is covered by the back-vaulting, formed as follows:

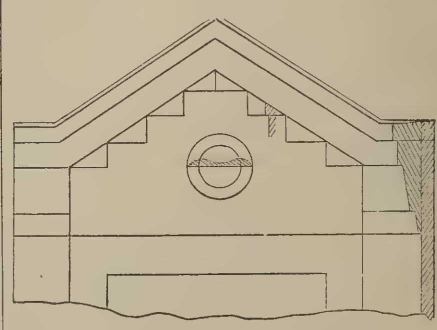
From the crown of the semi-circular rebate we carry up a distance Y Z equal to one-third or one-half of the depth Y′ Z′ on plan; on the inner face of the wall we draw an arc E Z F, with a radius Z *w* large enough to insure that the points E and F be at a higher level than the crown of the rebate. The surface of the back-vaulting will be generated by a straight line bound to remain in contact with the axis of the arch, the arched arris of the rebate and the upper curve E Z F last delineated. This will determine the surface of that back-vaulting between the two generators O E and O F; but there will remain the space beyond that to be covered. We might get over that difficulty by prolonging the directing curve E Z F; but it would probably produce a surface which would not allow the circular-headed leaf of the door to be opened. Through experience it has been found that it was better to take from the points E and F other directing curves delineated on the planes of the door jambs, and use them for completing the generation of the surface



Outside Finish of Windows.

by the motion of a straight line bound to remain in contact with the axis of the arch, the arris of the rebate as before, and with those last guiding curves C E and D F.

Method of Delineating the Curves on the Splayed Jambs.—If we turn down the plane D′ F′ of the left-hand jamb so as to bring it parallel to the elevation plane, the joint F will be carried to F″, and the circular-headed leaf of the door will be represented by the quarter of a circle drawn with the center O″. We conclude, therefore, that the guiding



Outside Finish of Windows.

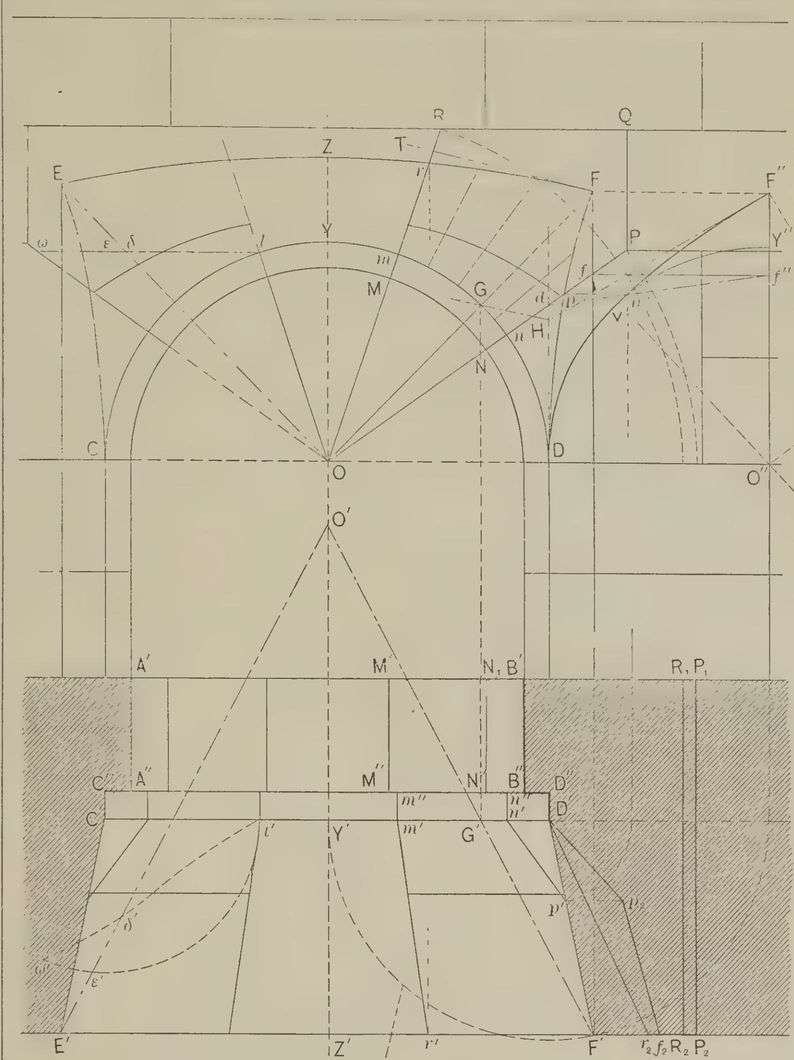
curve of the vaulting is to some extent determined by its having to contain the outline of the head of the door leaf. This could be obtained by taking for the guiding line D F″ an arc of a circle tangent to the circle of the door-head and passing in F″. But there is an-

other condition to be fulfilled—viz., the surface of the vaulting below the generator G F must continue the surface of the vaulting above G F—in other words, G F must neither form an arris nor a valley. We know that the two surfaces which meet in G F will be continuous if the said surfaces are tangent to one another in three points of that generator G F.* This condition is fulfilled by the two surfaces in the prolongation thereof in the point ($O\ O'$) and also in the point ($G\ G'$), for in these points the directing lines of both surfaces are the same. To complete the connection, we have only to arrange that the surfaces be tangent also in the point ($F\ F'$). Now, we observe that the plane tangent to the upper surface passes through the generator O G F and through the tangent F T to the upper directing curve. This plane intersects the vertical plane which contains the circular arris of the rebate, and the intersection is G H parallel to F T. The intersection of that same plane by the vertical plane of the splayed jamb is a straight line connecting the points F and H. The intersection will appear on the turned-down jamb as the line F'' H. Now, the plane tangent to the lower vaulting in the point F passes through the generator O G F, and the tangent to the directing curve drawn on the jamb. If the surface of the lower vaulting is continuous with that of the upper vaulting, the last tangent will be contained in the plane tangent to the upper surface, and it will, therefore, be the line F H, which we have found above.

The problem of drawing the proper guiding curve on the jamb is thereby brought back to delineating a curve which will be tangent to the line F'' H and to the circle formed by the upper part of the door-leaf when open. This curve will form the upper part of the directing curve, of which the circle of the door-leaf will form the lower part. To produce this we shall take the straight line $F''\ \phi$ perpendicular to F'' H and equal to O'' D; then through the center of $O''\ \phi$, if we produce a perpendicular to $O''\ \phi$, it will cut the line $F''\ \phi$ in a point which will be the center of the arc F'' I required. We must note that the solution of this problem will only be satisfactory when the line F'' H does not cut the circle D I Y'' head of the door-leaf. If this be not so, the upper directing arc E Z F must be raised.

The guiding curve on the jamb having been drawn in its real shape on the plane turned down in D F'', the projections thereof on the drawing can be found in the usual way by rotating back various points of the curve; the point p'', for instance, will in the rotation describe a horizontal circle, its plan will come in p', and its elevation in p.

It remains to be seen whether the vault constructed on the above guiding lines will allow the door-leaf to be opened. The surface described by the circular head of the door-leaf forms a surface of revolution resembling somewhat the mouth of a trumpet. We have only to cut by horizontal planes both surfaces, the vault and the surface of revolution engendered by the door-leaf, to find points where these surfaces intersect. If these points are within the face of the door jamb, the door can be opened; if, on the contrary, they are in front of the door jamb, then the door will be stopped before it can be laid back on the jambs. In the latter case, the directing lines must be altered, especially the arc above the door must be raised. The section in the surface of revolution is a circle as $l'\ \varepsilon'\ w'$ on the left-hand side of our plan; the section of the vault is obtained by drawing a few generators and finding their intersection with the horizontal plane; joining the points found will give us such a curve as $l'\ \delta'\ w'$, by which we see that the intersection of the surfaces at that level is in w' within the face of the jamb.



Practical Masonry.—Fig. 47.—Splayed Back Vaulting to Semi-Circular Archway, &c.

The archway is divided into voussoirs, as in any ordinary arch. To cut a voussoir we must get its bed molds. To get them we turn down the bed joints round the axis of the arch; the arris of the reveal and the rebate will coincide with the reveal and rebate in the plan. For the joint M R the joint r will turn down in r_2, and the mold will be found $B'\ B''\ D''\ D'\ r_2\ R_2$. For the joint N P we must turn down the point p where the joint meets the face of the jamb, and the point f where it meets the inner face of the wall; this gives us a mold with a broken line $D'\ p_2\ f_2$. But the point p_2 should be found direct without using the projection of the jamb curve, which usually the mason does not draw in his working drawings. The joint N P meets the vertical lines D d and F F', which belong to the jamb face; we can, therefore, get thereby the intersection of the joint and the jamb in $d\ f''$ on the turned-down jamb; this gives us p'' with mathematical precision. We find the plan and elevation of p and turn it down on the plan as before to delineate the mold.

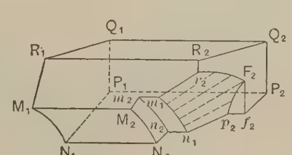


Fig. 48.—The Corner Voussoir.

Fig. 47. *Method for Cutting the Corner Voussoir.*—We begin by cutting out a prism, the base $M_1\ N_1\ P_1\ Q_1\ R_1$ of which is equal to the elevation of the voussoir; the length of the prism to be equal to the thickness of the wall. With the help of the molds we draw the outlines of the lower and upper bed, and of the inner face $R_2\ r_2\ F_2\ f_2\ P_2\ Q_2$. The cylindrical reveal is worked with a templet; the sinking of the rebate is obtained by a gauge cut from the plan $A'\ A''\ C''\ C'$; a templet may also be used. The part $F_2\ f_2\ p_2$ of the jamb is a plane worked from the lines $F_2\ f_2$ and $f_2 p_2$; its mold is obtained in Fig. 31 on the turned-down jamb equal to $F''\ p''\ f''$. The guiding lines of the surface or the vault are now completely delineated, and we have only to mark thereon the extremities of its generators to work the surface of the vault with the help of a straightedge.

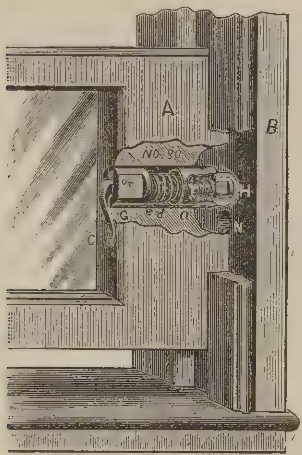
THE ROMANS had a method of finishing the inside of rooms with tiles made to adhere by compressing the tile firmly against the freshly plastered wall. In some of the ruins lately exhumed in Rome these tiles are found yet adhering with a wonderful tenacity. They attained the art of ornamenting these by figures of various colors, burned into the tile and frequently covered with a colorless glazing.

* This property must be studied in a special treatise of modern geometry. I have demonstrated the same in some articles on "Descriptive Geometry," written in 1885; and in the Guilds Institute I showed it by means of a hread model.—L. H.

NOVELTIES.

King's Improved Sash Support and Bolt.

The accompanying illustration Fig. 1, shows an improved form of sash, support and bolt attached to the sash, a portion of which is removed to show the construction of the Bolt and the method of its operation. The article represented is being introduced by the Palmer Hardware Mfg. Co., Troy, N. Y. The barrel, as will be inferred from the cut, is pressed against the jamb by means of a large spiral spring, D, the object of this pressure being to



Novelties.—Fig. 1.—King's Sash Support and Bolt.

hold the sash at any desired point and prevent rattling. Through the barrel a bolt passes, which is actuated by a small spiral spring inside the larger spring. This bolt thus acts independently of the barrel, and the office of the spring is to force the bolt into the hole N, and lock the sash when closed. This bolt is connected with and operated by the lever C by means of a rack and pinion movement, so that it is readily withdrawn when desired. By moving the same lever C upward, the bolt is carried backward to a point where it engages with the barrel, so that by continued lifting on the lever it is drawn in, and its pressure on the jamb relieved, the sash being thus allowed to slide freely. The lever also serves as a lifter in raising the sash. Whenever the lever is dropped, the barrel is again forced against the jamb, so as to hold the sash securely, preventing it from falling. The points made in regard to this article are: That it supports the sash at all points, locking it when closed; that it prevents rattling and does not disfigure the sash; that it is almost entirely out of sight; that it can readily be applied; that it is not liable to get out of order, and is furnished at a moderate price.

The Kizer Hammer.

The Kizer Hammer Company, Washington, D. C., for whom Danforth & Pike, 114 Washington street, Boston, Mass., are agents, are introducing to the trade a new hammer called the "Kizer," which is represented in Fig. 2 of the illustrations. It will be seen that this hammer differs from a regular nail hammer in the construction of the claw, which has a new device for drawing nails and terminates in a blade. The nail is drawn by means of a slot in the side, which bites or grips the nail at the point of contact. It is pointed out that the grip being transverse to the slot instead of parallel to it, as in other hammers, it is much stronger and the nail is drawn with certainty. It is claimed that wire nails, which are coming into such general use and are drawn with so much difficulty with the regular hammers, are drawn readily with this hammer, which from its construction is referred to as adapted to drawing a headless nail as well as one with a head. Its utility in drawing screws, the heads of which are broken off, is also alluded to, and it is claimed that if the screw projects sufficiently to permit the hammer to grip it it can be withdrawn. In the repairing of houses and frequently in the construction of new buildings it is desirable to remove the trimmings, such as moldings, &c., and to take the nails therefrom is difficult, as they cannot be driven through the face without damaging the molding, so that it is necessary frequently to cut off the nails. It is claimed that this trouble is avoided by using the Kizer hammer, as the head can be drawn through from the back. The blade of the hammer is described as finely tempered and given an edge, as shown, so that it may be used as a box scraper, for cutting hoops, beveling the edges of boxes preparatory to hooping them, and other uses, as an adze or draw knife, while it can also be used as a small vise for filing bolts, &c. The Kizer hammer is stated to be forged from the best tool steel and is made in two styles, the plain and the bell face, and the manufacturers guarantee to replace every hammer which is broken in legitimate use.

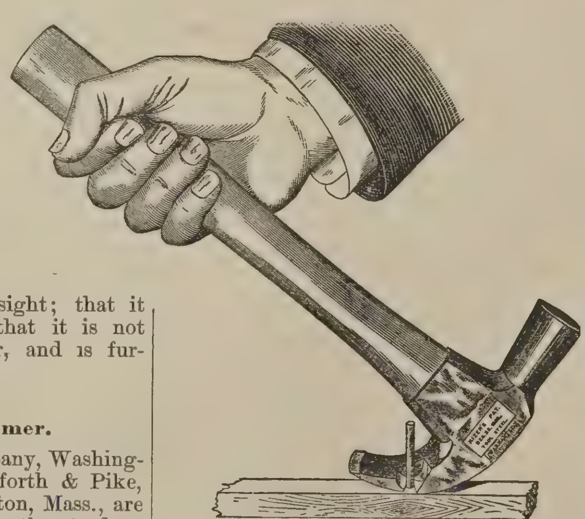


Fig. 2.—The Kizer Hammer.

The Rouser Burglar Alarm.

This article, which is illustrated in the cut, Fig. 3, is manufactured by E. C. Ellwood, Green's Farms, Conn. It will be seen at a glance that this is a device for exploding a cartridge when the window or door to which it is applied is opened. The illustration represents it as attached to the right side of the window frame on the stop bead E, F being a portion of the sash. The hammer B is pivoted to the post A by a pin, as shown. The hammer when the alarm is set is held up by the stop C, which is screwed to the sash. When the hammer is raised to this position tension is put upon a coiled spring which encircles the pin above mentioned, and when the sash is raised a slight distance the stop C passes off the end of the hammer B, and the spring carries down

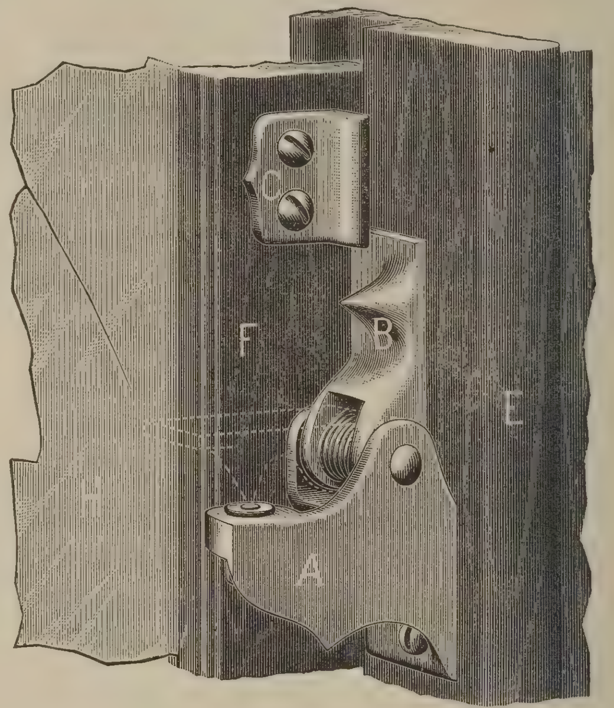


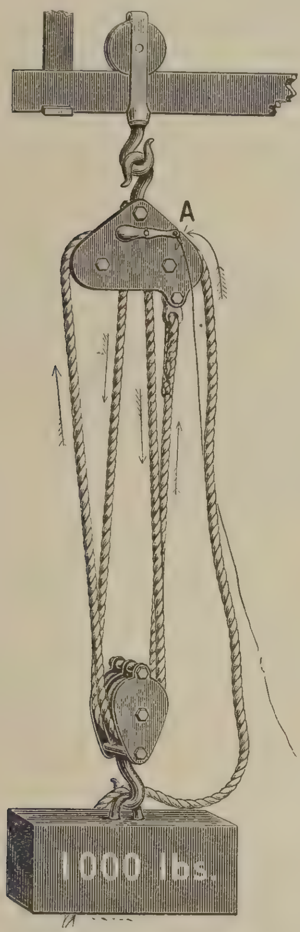
Fig. 3.—The Rouser Burglar Alarm.

the hammer, the point of which strikes the head of the cartridge, as indicated in the dotted lines. The cartridges used in this alarm are Smith & Wesson's 32 calibre central fire blanks. It is pointed out that the stop C may be so set that a very slight upward motion of the sash will free the hammer so that the alarm will operate before a burgler can pry up the lower sash enough to break a sash fastener. This device is also made in modified styles for application to doors, and it can also be readily attached to outside blinds. It is made in different styles of finish.

Sure-Grip Steel Tackle Block.

The Fulton Iron and Engine Works, Detroit, Mich., are putting on the market the Detroit Patent Sure-Grip Steel Tackle Block, Fig. 4, which has been invented by Alexander M. Kerr, the superintendent, and patented September 4, 1888. The special feature of its construction is the brake, Fig. 5, which, it will be observed, is exceedingly simple, consisting only of a wedge, which is double acting, and so efficient in its operation, that it is described as absolutely automatic and certain in holding a load suspended at any desired hight without fastening the rope. The body is made of steel plates, the pins being cold rolled steel. The castings are malleable iron, thus making an especially strong and safe construction. The brake is a fluted wedge, dropped between two ropes in such a manner that the load is brought on all strands of rope at the same time. It is also pointed out that the heavier the load the more efficient the brake, owing to the fact that the fluted wedge is drawn down and points between the sheaves in proportion to the weight of load. It is also pointed out that the construction is such that the brake does not flatten the rope, wear on it being thus reduced to a mini-

mum, and it is claimed that a partially worn rope can be used in this machine to as good advantage as a new one. The economy of labor connected with its use is also alluded to, as by its use one man can take the place of two as the brake holds the load at the



Novelties.—Fig. 4.—Detroit Sure-Grip Steel Tackle Block.

end of each effort made by the operator, thus enabling him to secure a fresh grip on the load with both hands, or the load can be left hanging at any point without further attention. This block is intended for use by bridge and ship builders, contractors, hardware and other merchants, truckmen, machine shops, &c., and in

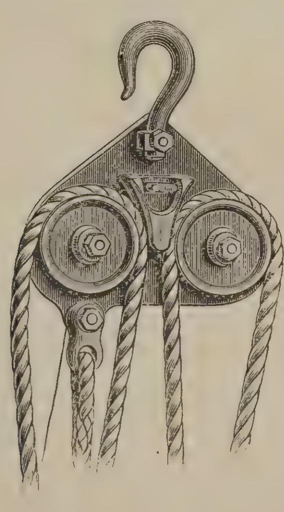


Fig. 5.—Tackle Block, Showing Arrangement of Brake.

stringing heavy electric wires, handling barrels, baled hay, &c. The invention is the result of a necessity long felt in the company's shops for a block which would raise and lower quickly and where the hight of hoist is not limited, and with no possibility of the brake slipping when the load is suspended. The satisfaction with which the contrivance has been received in the short time it has been on the market is alluded to as indicating that it meets a want of the trade.

The J. G. C. Spring Hinge.

This hinge has recently been put on the market by the Coleman Hardware Company, 55 Dearborn street, Chicago, and Morris, Ill. It is represented in the illustration herewith given, Fig. 7, and has, it will be observed, two long springs arranged as shown in the cut, which are referred to as giving great elasticity and equalizing the tension. The simplicity of the hinge, the fact that it cannot come apart, that it is reversible and holds the door either open or closed, as desired, are points that are made in regard to it. It is put on the market with special claims for its merits as a light hinge, and the low price at which it is offered to the trade is also alluded to. Every pair is warranted satisfactory to the user, and samples will be sent to the dealer on application.

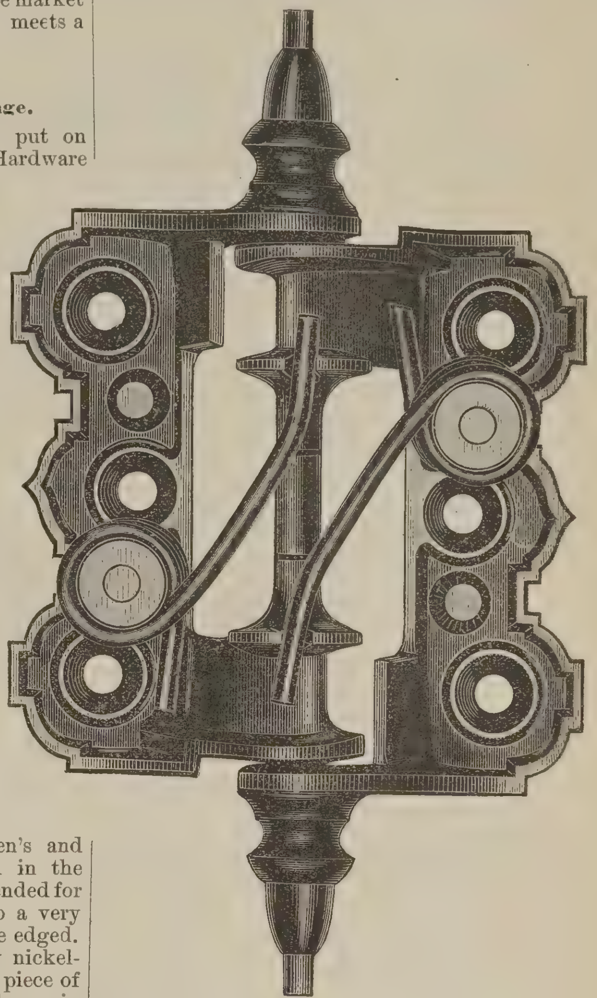


Fig. 7.—The J. G. C. Spring Hinge.

Duplex Pencil Pointer

Kolesch & Co., 155 Fulton street, New York, are putting on the market a pencil pointer, designed especially for draftsmen's and artists' use, which is illustrated in the accompanying cut, Fig. 6. It is intended for sharpening the lead of a pencil to a very fine point, either round or knife edged. It is made of brass, handsomely nickel-plated, so arranged as to hold a piece of fine emery cloth in the position shown in the cut. This gives the abrading surfaces by means of which the pencil is pointed. The substitution of a new piece of emery cloth is easily accomplished, as the inside holder can be pushed out, when a new sheet can be readily inserted. The illustration represents the use of the pointer in giving a round point to a pencil, but if a flat edge is desired it is explained that the point may be pressed lightly in the groove of the sharpener and drawn lengthwise from end to end.

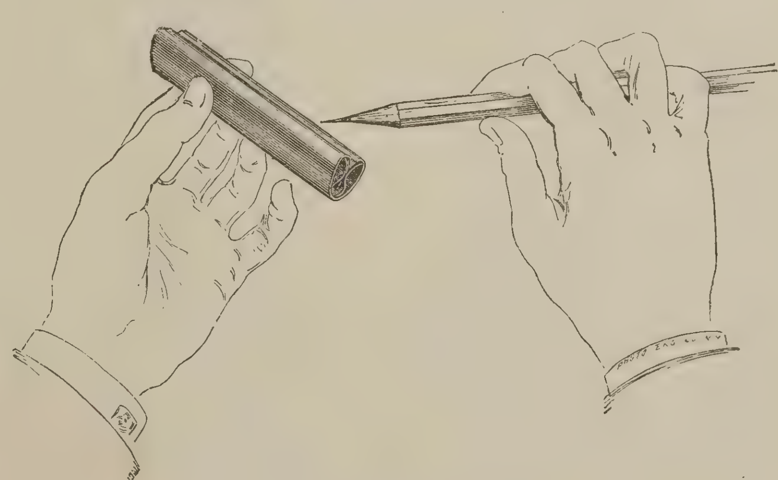
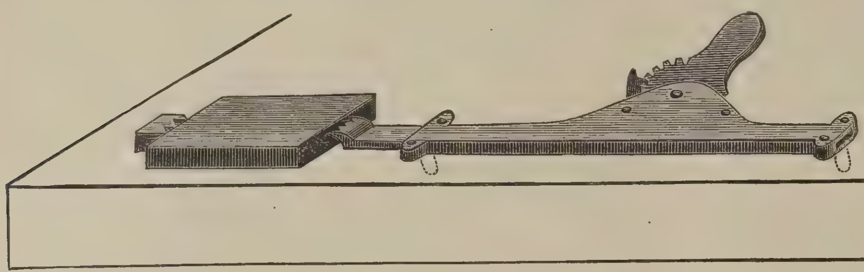


Fig. 6.—The Duplex Pencil Pointer.

Improved Bench Dog.

A new bench dog has been brought out by Larson & Frauman, of Anoka, Minn., who are the sole manufacturers. It is the invention of Frederic Larson, to whom letters patent have been issued covering its essential features. The accompanying cut, Fig. 8, illustrates the device and the method of its use. As shown here, a block is held in position by the dog, but it is intended to hold a board of any length, limited of course by the length of the bench. The illustration is slightly imperfect in representing an upward curve at the toothed end of the dog. As the device is now made, the dog lies flat, so that a very thin board can be held by it, even down to $\frac{3}{16}$-inch in thickness. It consists of a longitudinally reciprocating bar, provided with rack teeth on the side to engage with a toothed segmental lever, which is pivoted to the frame and cap-plate. A pawl is placed in front of the segmental lever to secure it in place, a stiff spring causing the pawl to operate automatically as the dog

is tightened up to the board by the lever. The objects of the device are, to inclose, protect and guide the sliding dog by a frame extending substantially its whole length, and to afford facilities for securing the dog at both ends to the top of a bench. To fasten the dog to a bench, it is provided at each end with a downwardly projecting pin slightly inclined to the rear to enter holes which are bored in the top surface of the bench, $2\frac{1}{2}$ inches apart. The dog is specially adapted to use in cabinet shops for hard wood when very thin material is being worked. It can also be used with advantage by gunsmiths to hold their guns in finishing. It is made of the best malleable cast iron, nickel plated, is 7 inches long, and weighs about 1 pound.



Novelties.—Fig. 8.—Improved Bench Dog, Made by Larson & Frauman, Anoka, Minn.

A New Form of Cut Nail.

The accompanying cut, Fig. 9, represents a new steel cut nail, of which at present the Calumet Iron and Steel Company, of Chicago, are the sole manufacturers. Its sides are parallel, it has a chisel point, and it is cut so light as to run about the same number to the pound as the wire nail. The manufacturers claim a number of advantages for this new form of nail over both the old style of cut nail and the wire nail. The old-style cut nail with a blunt point necessarily break the fiber of the wood into which it is driven, while the parallel chisel-pointed nail cuts, separates and deflects the fiber slightly downward compactly on the side of the nail, thus causing the wood to fit tightly about it, and excluding moisture to rot the wood, and in time loosen the nail. Being also rough, and of uniform width throughout its length, instead of smooth and wedge-shaped like the old style of cut nail, it naturally has greater holding power. Actual tests are reported by the manufacturers as showing 30 to 75 per cent. more holding power than the old cut nail, and 50 to 100 per cent. more than the wire nail, according to the character of the wood. The new nails are also claimed to drive in hard wood without bending, where the wire nail cannot be used without first boring holes. Being of about the same weight as wire nails, they commend themselves to those who desire light, strong nails at a lower price. They are sold at a slight advance above the price of the ordinary steel cut nail and are branded "P. C. P."

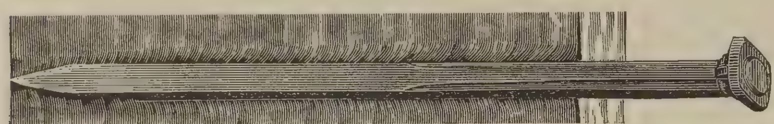


Fig. 9.—The "P. C. P." Nail.

Special Form of Sash Balance.

Some time since we illustrated in these columns the Pullman Sash Balance, manufactured by the Pullman Sash Balance Company, Rochester. In Figs. 10 and 11 of the illustrations we show the mullion form of their balance and its method of application. It will be understood by a moment's reference to the engravings. Instead of applying the balance at the side of the sash, which, while possible with frames as ordinarily constructed, is impossible in the case of twin windows, the balance is put above the sash, as indicated in the sectional view. This greatly enhances the value of the balance, inasmuch as it increases the range of its applications. The views explain themselves.

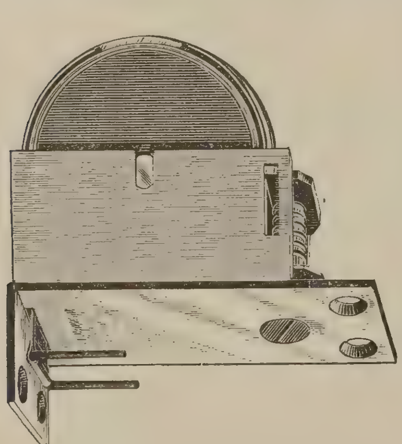


Fig. 10.—Pullman Sash Balance for Mullion Windows.

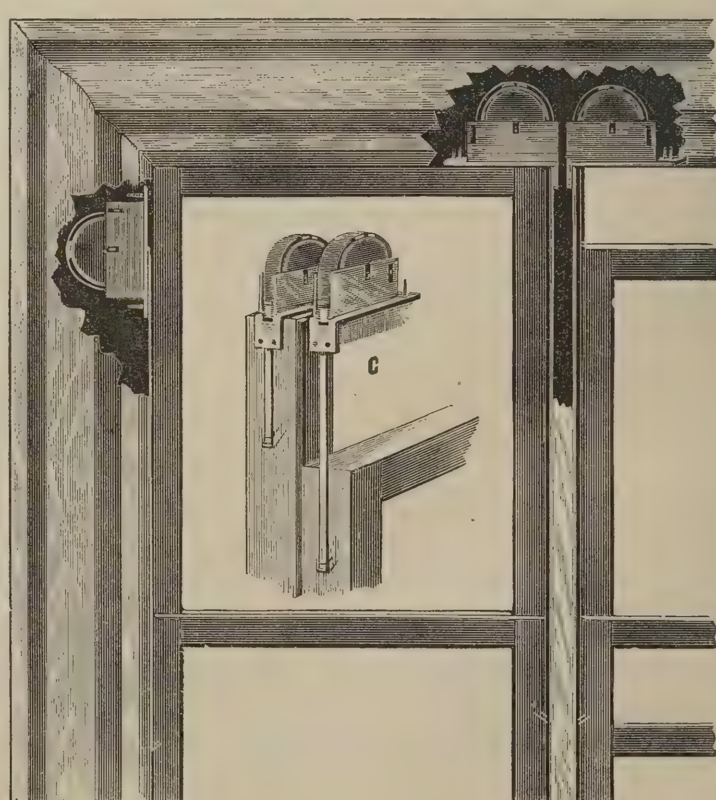


Fig. 11.—Diagrams Illustrating the Use of the Pullman Sash Balance for Mullion Windows, &c.

The Clipper Grinder.

The Higganum Mfg. Corporation, 189 and 191 Water street, New York, are putting on the market an interesting line of grinders, invented and patented by Mr. R. Dutton, one of which is illustrated in the cut herewith given. The No. 4 Clipper, a view of which is presented in Fig. 12 of the engravings, is run, it will be observed, by means of a belt, and is designed for grinding plane irons, chisels, gouges, &c. It has four wheels, numbered 1, 2, 3 and 4 in the cut. There are also, it will be seen, clamps E and F, which are used for holding the tools to be ground. The wheels 1, 2 and 3 are used for grinding gouges, and are respectively $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ inch in thickness, the rims

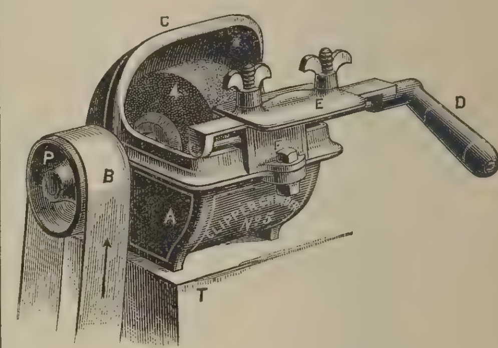
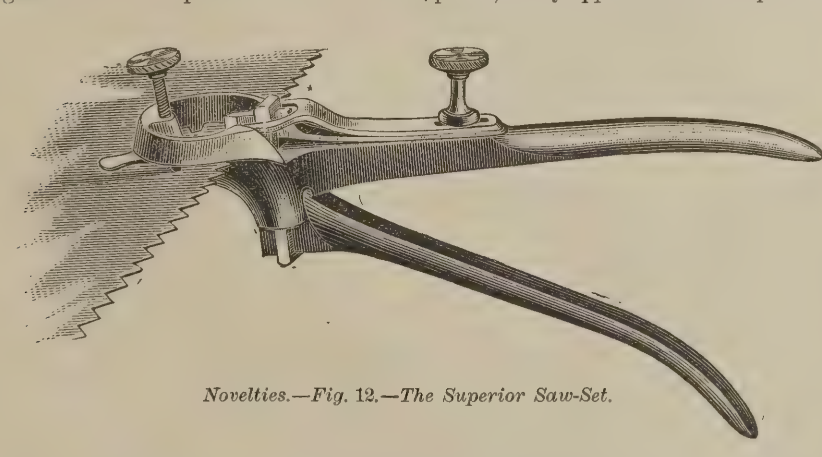


Fig. 12.—Clipper Grinder with Attachment for Grinding Gouges.

being rounded. Small gouges less than ½ inch in diameter will be ground upon wheels Nos. 2 and 3 while held and guided with the hands, but for larger gouges the swivel and gauge clamps, F and H, are used, the cut representing this attachment as down in the position in which it naturally remains when not in use. In using this clamp the gouge to be ground is securely fastened in it at F, the hinge at H permitting the requisite pressure on the wheel, while the rocking motion permitted by the swivel allows the grinding of the entire edge of the gouge, an operation which is, it is claimed, accomplished with great ease and success. Wheel No. 4 is flat-faced, 1¾ inches thick, 5 inches in diameter, and has a hollow in the center 3 inches in diameter. The corundum grinding-wheel used in this machine is referred to as superior to the emery-wheel. Water when placed in the trough is admitted to the inside of the wheel through a small opening in one of the flanges for holding the wheel in place, so that it has water both on its inside and outside. When operating the machine the water in the center of the wheel is described as being driven through the pores of the wheel, wetting every particle thoroughly. This is referred to as preventing the tool while being ground from heating or having its temper drawn, and also preventing the wheel from becoming glazed by use. The tool while being ground is held firmly in the clamp E, which is directly in front of the operator and controlled by his left hand by means of the handle D. By this means plane irons, chisels, &c., may be quickly ground to the bevel desired, and the manufacturers allude to the accuracy and perfection with which this is done. It is claimed that with this machine a gouge can be as quickly and easily ground as an ordinary plane iron or chisel. This grinder is intended to be run from 700 to 800 turns per minute, the arrow showing the direction. Its weight is 17¼ pounds

The Superior Saw-Set.

The American Tool Company, Canton, Ohio, are manufacturing the saw-set shown in Fig. 12 of the illustrations. It is designated as the Superior. In the use of



Novelties.—Fig. 12.—The Superior Saw-Set.

this saw-set the gauge is set over the die-bar to the length of the saw-teeth, and the set for the teeth is regulated by lowering or raising the gauge screw, locking it with the small lock nut, which can be used above or below the hood. The point is made that in this way all the teeth are given exactly the same set. Special attention is also called to the fact that as this saw-set is made the hood, bed plate or anvil, and die-bar are so arranged as to give the operator full view of the saw teeth while setting. The pressure is referred to as easy and directly downward on the teeth, without liability of bending or twisting the saw or saw blade, or breaking the teeth. The manufacturers also call attention to the excellence of material and workmanship.

Post's Window Fastener

The accompanying illustration, Fig. 13, represents a simple and efficient device

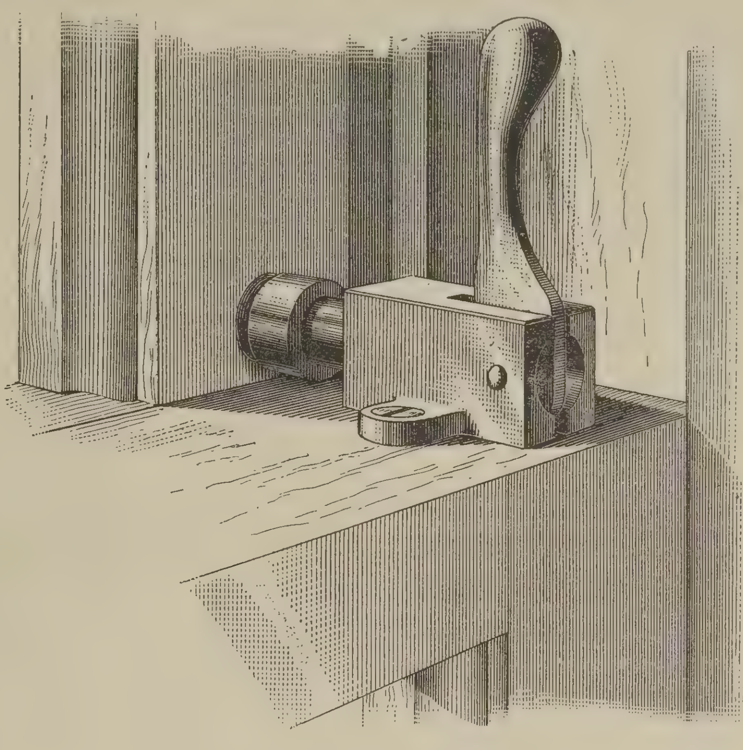


Fig. 13.—Post's Window Fastener.

which has been patented by A. J. Post, of E. L. Post & Co., 10 Peck Slip, New York, by whom it is manufactured and put on the market. It is represented in the cut as attached to the top of the lower sash, and its use will be understood as fastening the sashes and preventing them from rattling. The fastener consists of a bolt with a rubber end, such bolt being operated by a lever attached to a cam, thus giving the desired pressure with comparatively little power, easily applied. This simple device is so efficient in operation that it is described by the manufacturers as fastening windows securely so that they cannot be moved without releasing the pressure of the bolt. The rubber end is screwed on instead of being one solid piece, making the fastener adjustable, so that the bolt can be lengthened by slightly unscrewing the rubber end. This fastener is made in bronze, nickel-plate and brass. Its simplicity, efficiency of operation, durability, strength and neatness of appearance, as well as the ease with which it is applied, are the points which are made in regard to it. The low price at which it can be offered is also referred to.

Rod and Dowel Machine.

Mr. P. Pryibil, of Nos. 461 to 467 West Fortieth street, New York City, has brought out a rod and dowel machine, a general view of which is afforded by means of the engraving Fig. 14. The Spindle is made from a solid bar of steel of a diameter which renders it both safe and durable. It is provided with self-oiling bearings scraped to fit perfectly and having the caps planed in and furnished with

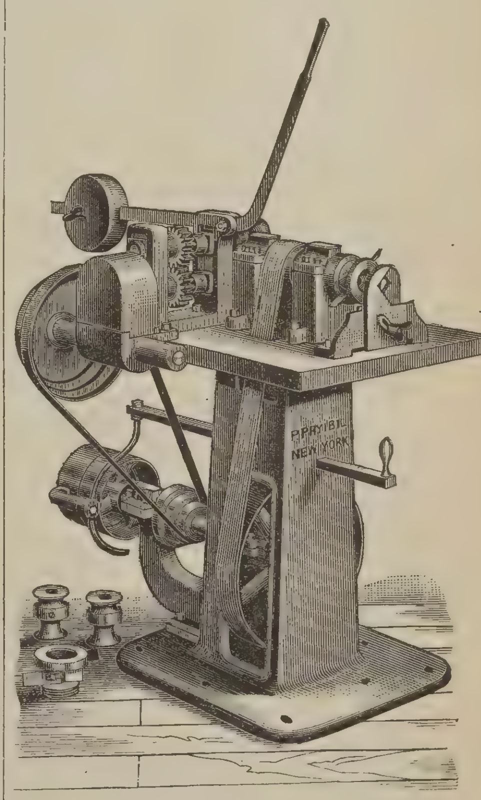


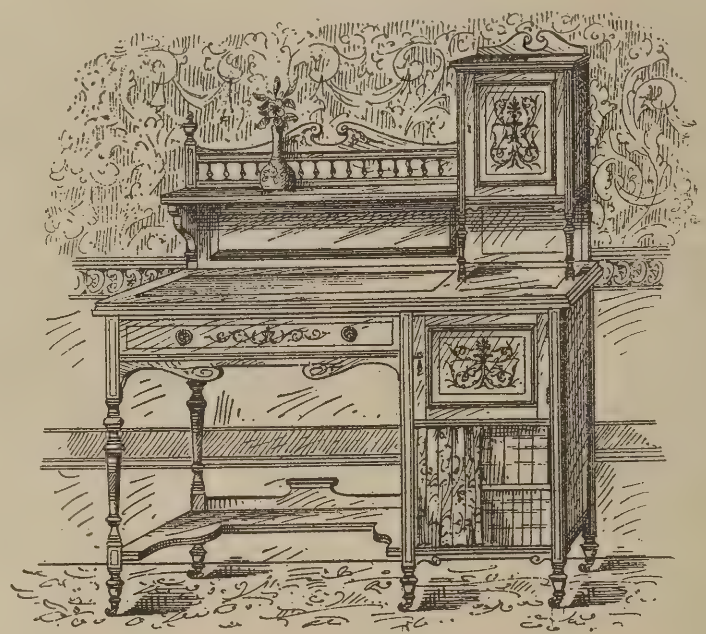
Fig. 14.—Rod Pin and Dowel Machine.

both back pressure and holding down screws. The feed rolls are placed outside of their bearings, and can be exchanged without loss of time or disturbance of parts. Each pair of rolls is grooved for two sizes of rods. The feed is so arranged that it

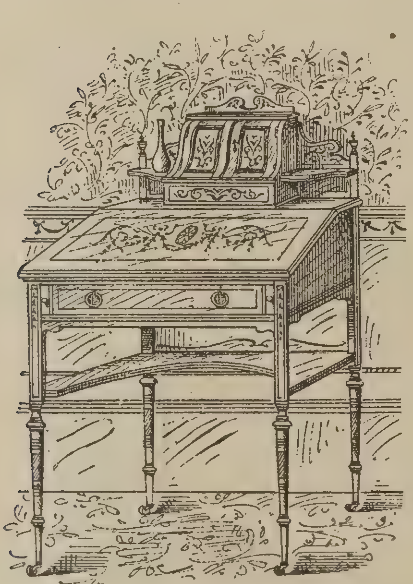
can be regulated in point of speed by shifting a belt on a cone pulley, and can be instantly stopped when desired. The cutter-head carries two plain, flat, chisel-shaped knives without slots, which are claimed to be easy to grind and cheap to replace. One of these is designed to do the roughing, while the other does the finishing. The back part of the cutter-head is bushed with steel, which adds to its durability. The countershaft is on the machine. It has a self-oiling pulley, and is provided with a belt shifter, which can be worked from the operator's position in front of the machine.

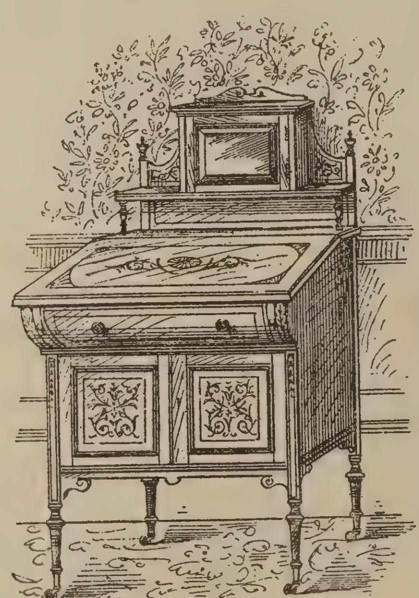
Designs for Fancy Writing Tables.

Among the designs for fancy writing tables on this page the cabinet-maker who wants something fresh and saleable may be able to find an idea likely to suit his customers, tables of this description being the prevailing idea of what is required as a writing table. The sloping tops of the two small tables are intended to lift forward, draw rests to receive them being shown on either side of the drawers in the design. A fitted stationery cabinet is placed above the slope on the first table, a glass-door cupboard being substituted in the second design, the stationery fittings in this instance being placed inside the fall; or, with a view to economy, this might be omitted and the drawer utilized for that purpose, leaving the space below the fall, as in the first sketch, plain, for manuscripts, &c. The design of the larger table admirably adapts it for a room in which the direct light is not attainable, the stationery cupboard being placed right or left as the exigency of the light would require. A cupboard, drawer and two small book shelves being combined in this design, make the article a very compact and useful table, such as would commend itself to those seeking a piece of furniture of this description for presentation. Being intended for drawing-room furnishing, these writing tables should be made up in rosewood, with inlaid box lines and marquetry panels.



Design for Larger Fancy Writing Table.





Designs for Small Fancy Writing Table.

Primitive Building Terms.

Max Müller, in discussing primitive building terms, says: What the husband was in his house, the lord, the strong protector, the king was among his people. Now, a common name for people was *vis* in Sanskrit, from which the title of the third caste, the householders, or *vaisyas*, is derived. It comes from the same root from which we have in Sanskrit *vesa*, house, οἶκος, *vicus*, Gothic *veihs*, German *wich*, and the modern English termination of many names and places. Hence *vis-pati* in Sanskrit meant king—*i. e.*, lord of the people, and that this compound had become a title sanctioned by Arian etiquette before the separation is confirmed in a strange manner by the Lithuanian *wiěsz-patis*, a lord; *wiěsz-patene*, a lady, as compared with the Sanskrit *vis-patis* and *patnî*. There was, therefore, at that early period not only a nicely organized family life, but the family began to become absorbed by the State, and here, again, conventional titles had been fixed, and were handed down, perhaps, 2000 years before the title of Cæsar was heard of. We have seen that the name of house was known before the Arian family broke up toward the south and the north, and we might bring further evidence to this effect by comparing Sanskrit *dama* with Greek δόμος, Latin *domus*, Slavonic *domŭ*, Celtic *daimh* and Gothic *timrjan*—to build—from which English *timber*, though we doubt the identity of the Slavonic *grod* and *gorod*, the Lithuanian *grod*, with the Gothic *gards*, Latin *hort-us*, Greek χόρτος, all meaning an inclosed ground. The most essential part of a house, particularly in ancient times, being a door well fastened and able to resist the attacks of enemies, we are glad to find the ancient name preserved in Sanskrit—*dvar*, *dvâras*, Gothic *daur*, Lithuanian *durrys*, Celtic *dor*, Greek Θύρα, Latin *fores* The builder, also, or architect, has the same name in Sanskrit and Greek, *takshan* being the Greek τέκτων. The Greek ἄστυ, again, has been compared with Sanskrit *vâstu*—house—the Greek κώμη with Gothic *haims*—a village—the English *home*. Still more conclusive as to the early existence of cities is the Sanskrit *puri*—town—preserved by the Greeks in their name for "town," πόλις; and that high-roads also were not unknown, appears from Sanskrit *path*, *pathi*, *panthan* and *pâthas*, all names for path, the Greek πάτος, the Gothic *fad*, which Bopp believes to be identical with Latin *pons*, *pontis* and Slavonic *ponti*.

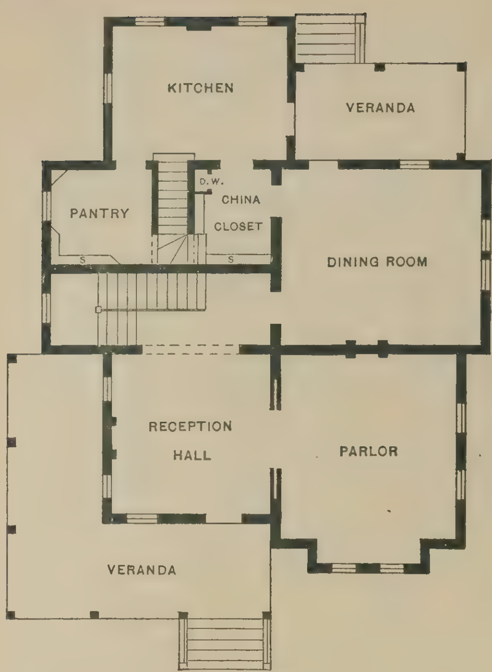
Be Careful.

The story is told of an ancient African, who while hoeing corn thought he saw the head of a toad projecting above the ground, and therefore promptly brought his hoe down with the intention of cutting off the toad's head. When he came to find out that it was his own toe he had cut off instead of a toad's head, he remarked (?) "some folks is born to be carless." Those of our readers who laugh at this ancient African may afterward think of the many times they have been careless. For example, they have often put a ladder "most anywheres," and gone up it to do a little work, without thinking any more about the consequences, or the absolute danger, than did the darkey in the story told above. These thoughts were called to mind by reading the following account from the Toronto *Daily Mail*, of May 22, of another person who might have been "born carless:"

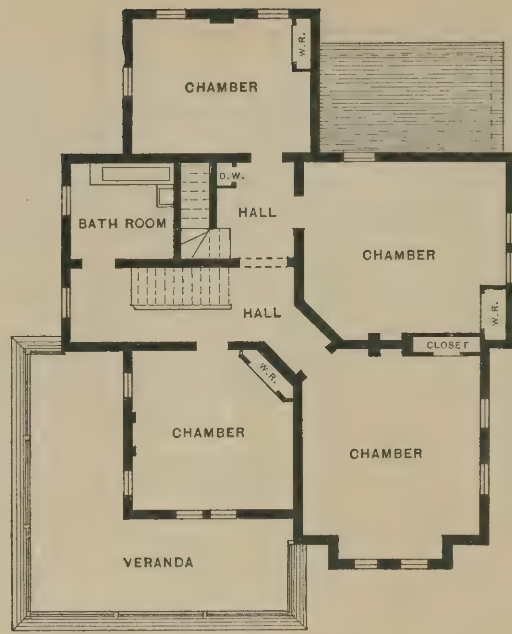
A horrible accident occurred this morning by which a young man named Alphonse Jette received mortal injuries. He was engaged in painting near the roof of a house on Queen street, when the ladder on which he stood fell. The young man's head struck the sidewalk with such force that his brain was forced out through his ears.

The wise men of the world are those who profit by the experience of others. If any of our readers are prompted to greater care when about their work by reason of this incident, the space we have devoted to it will not have been used in vain.

WALL PAPER DESIGN IN "FREE CLASSIC" STYLE.



FIRST FLOOR.

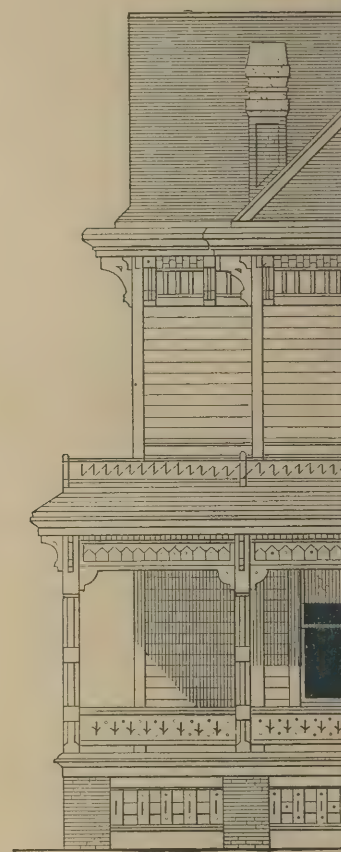


SECOND FLOOR.

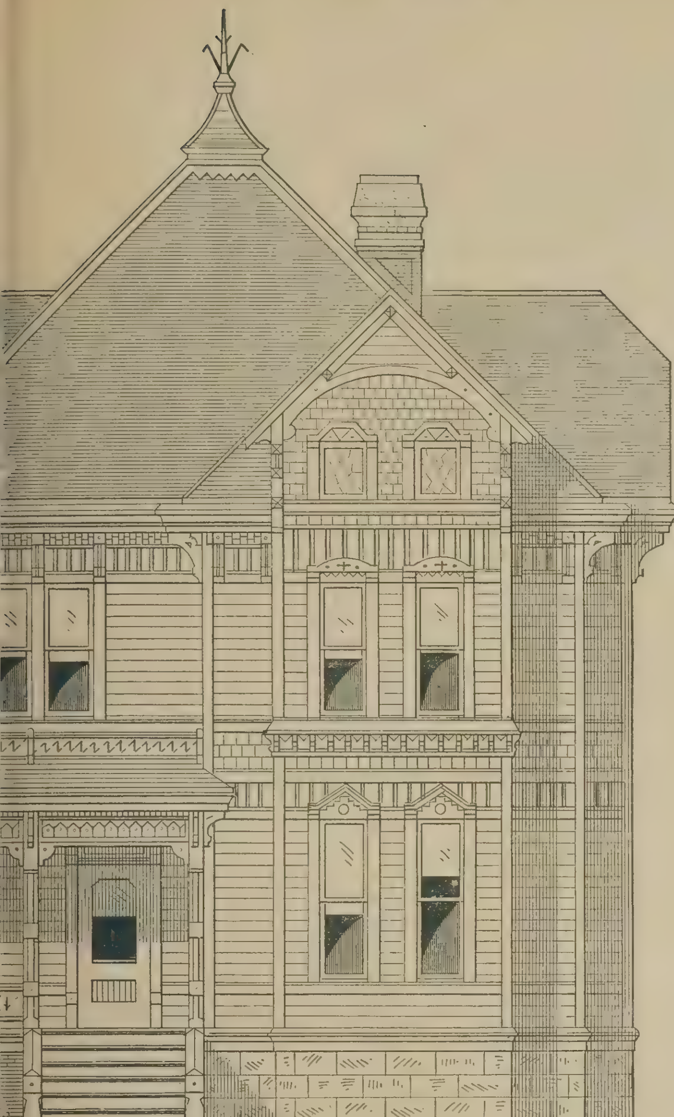
FLOOR PLANS. Scale, 1-16 Inch to the Foot.

Design for an Eight-Room Frame House.

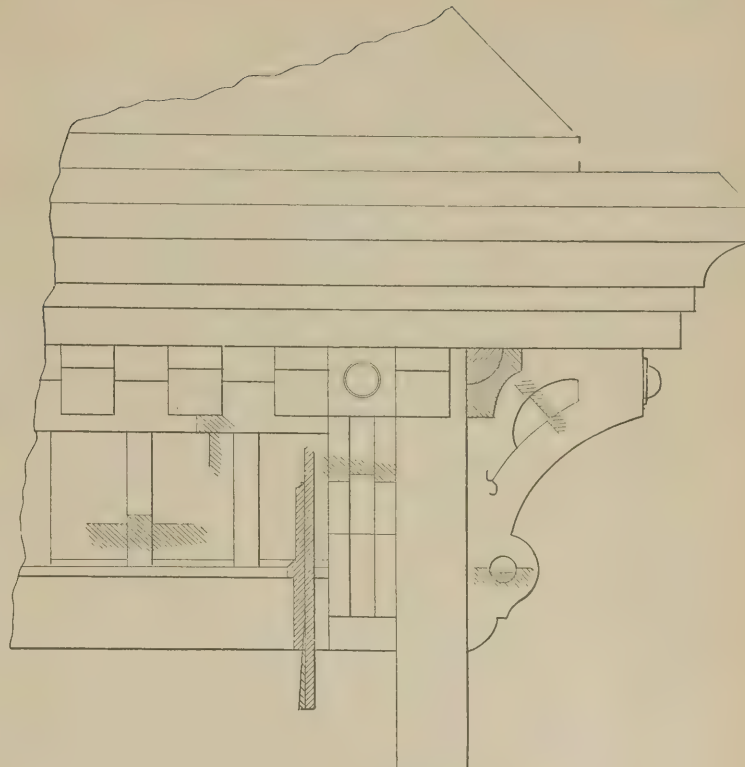
W. G. MUMMA, ARCHITECT, WARRENSBURG, MO.



SIDE ELEVATION (Left). Scale, 1-8 Inch to the Foot.

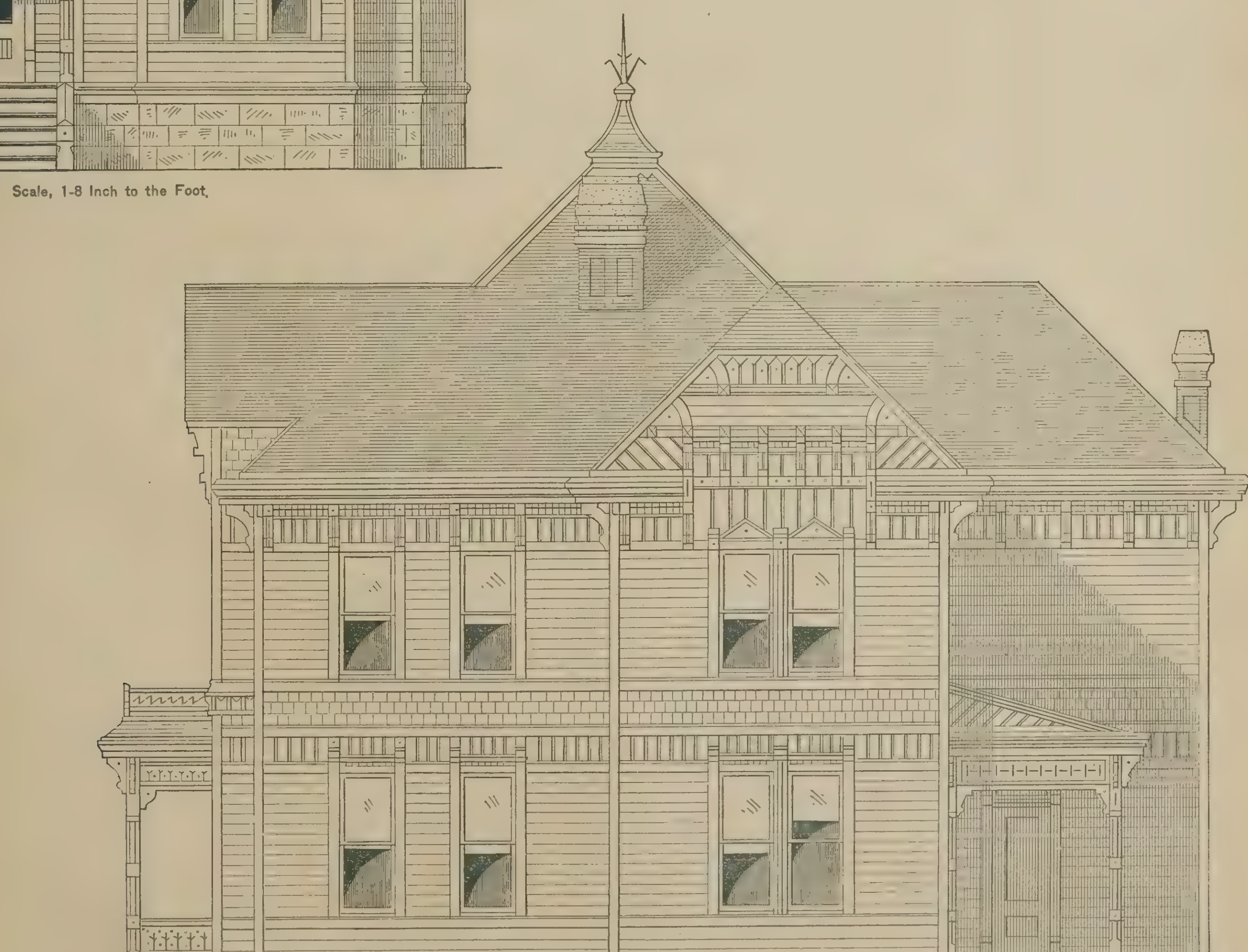


NT ELEVATION. Scale, 1-8 Inch to the Foot.

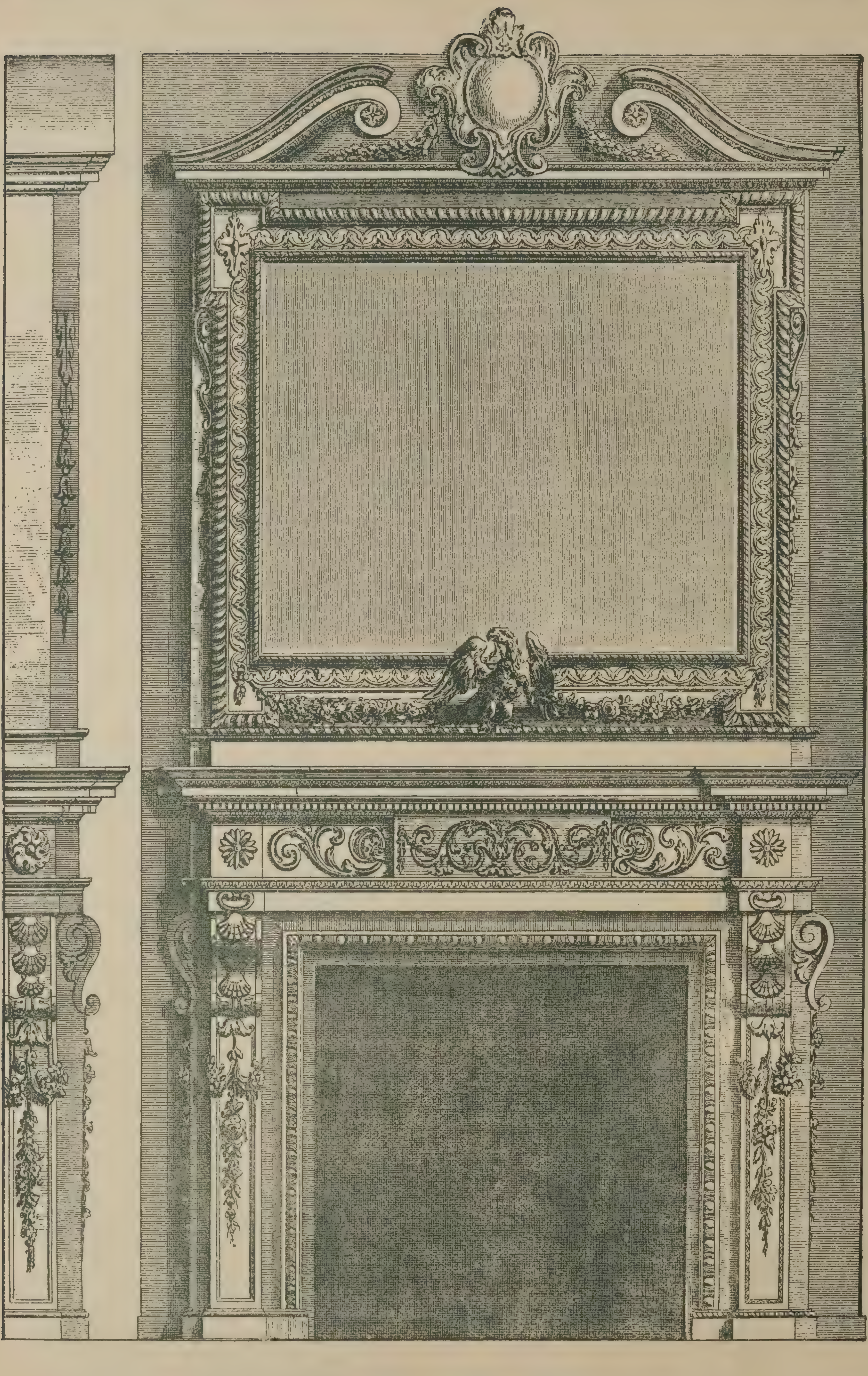


DETAIL OF MAIN CORNICE.

(For other Details and Description, see page 249.)



SIDE ELEVATION (Right). Scale, 1-8 Inch to the Foot.



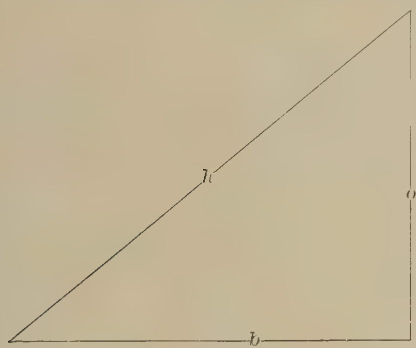
CARVED CHIMNEY PIECE, XVIIITH CENTURY WORK.

CORRESPONDENCE.

Calculating the Length of a Hypothenuse.

From Fred Lasey, *San Francisco.*—Method of calculating the length of any hypothenuse, h, from the ratio m, between the known lengths of the legs b and o. It is convenient to call one leg the base and the other leg the ordinate, which is always equal to $m\,b$, $h = b(1+m^2)^{\frac{1}{2}}$.

The square root of $(1+m^2)$ is the constant of the pitch. This constant needs to



Calculating Hypothenuse.—Diagram Accompanying Letter for Fred Lasey.

be calculated only once; it is then useful for all time for all similar pitches.

For instance, let h represent the common rafter of a square pyramid roof, of which b is the given run, and o is the given rise equal to $m\,b$.

$h = b(1+m^2)^{\frac{1}{2}}$.

Let H equal the top center line of the hip, then $H = b(2+m^2)^{\frac{1}{2}}$.

To calculate the lengths of the rafters all measures should be in inches.

When the rise = run, $m^2 = 1$, $h = b(1.4142)$, $H = b(1.7321)$.

When the rise = $\frac{3}{4}$ run, $m^2 = \frac{9}{16}$, $h = b(1.25)$, $H = b(1.6008)$.

When the rise = $\frac{2}{3}$ run, $m^2 = \frac{4}{9}$, $h = b(1.2019)$, $H = b(1.5635)$.

When the rise = $\frac{1}{2}$ run, $m^2 = \frac{1}{4}$, $h = b(1.118)$, $H = b(1.5)$.

When h stands at angle of 60° with the horizon, rise $= b(1.7321)$, $h = b(2)$, $H = b(2.2361)$.

Example: An ordinary hipped rectangular roof with a ridge 1 inch thick has for the common rafters a run of 180 inches, and a rise of 120 inches. All the rafters stand 3 inches above the wall plate. Required, net lengths of top center lines of common rafters and hips from outer face of ridge to toe, on a level with top face of wall plate and projecting beyond wall plate.

By conditions, rise $= \frac{2}{3}$ run, and run $= \frac{3}{2}$ rise.

For a rise of 123 inches, run $= \frac{3}{2}(123) = 184.5$ inches.

Hence, toe projects 4.5 inches beyond wall plate.

Net run of toe by deducting half thickness of ridge = 184 inches.

Net common rafter $= 184(1.2019) = 221.15$ inches.

Net hip $= 184(1.5635) = 287.68$ inches.

Net long edge of any jack equals net long edge of the longest jack, divided by the number of jacks, and multiplied by the number of this jack from the corner of the building.

The seat of any hip $= b(1.4142)$.

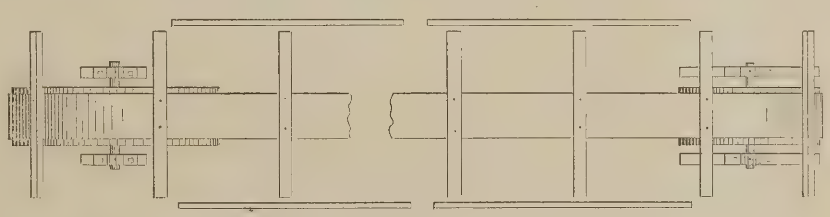
Marking Steel Tools.

From J. J. B., *Kalamazoo, Mich.*—Will you or some of the readers of *Carpentry and Building* kindly give me a recipe for a liquid preparation used for marking steel tools? This is interesting to all users of tools, and any person who can write his name can use it. The steel stamps that are manufactured are not as desirable for some tools as a preparation like the one I speak of.

Answer.—A liquid or ink for marking steel is the subject of any number of items that periodically appear in print. So many replies of the kind are published that it is impossible to keep track of them, and we cannot, in fact, recall any at the present time. The recipe books, however, all give a greater or less number of formulas for preparations of the kind, and from them we take the following, which has the recommendation of simplicity: "Protect the tool with a thin layer of wax or hard tallow by heating the steel and allowing the wax to cool. When the wax is hard the name is written through it with a pointed instrument. Pour nitric acid over the waxed surface and let it stand for a short time, after which wash the acid off with water and then remove the wax by gently heating the steel. The name will appear engraved in the steel, and, of course, the depth of the coating will depend upon the time of exposure." Perhaps there are other and better rules than the one here mentioned, but we think nitric acid is very frequently employed for the purpose. We do not doubt, however, that if others would send in their recipes they would prove of interest to many.

Conveyer.

From C. B., *Virginia Bridge, Va.*—I notice the request of "J. L. W." in the March issue, for a sawdust conveyer, and I think what I show in the accompaning sketch will answer his purpose, as very little room will be required. The sketch shows the construction and will explain the work satisfactorily. It will be necessary, of course, to proportion the conveyer to the quantity to be fed. The pulleys for connecting with the engine must also be calculated. If this scheme does not answer, he will have to get some automatic machinery for the purpose. During the past winter I worked negroes with shovels for carrying the sawdust when the conveyers were broken or choked.



Saw-Dust Conveyer Described by C. B.—Plan View.

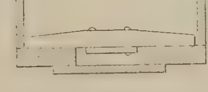
Moving Buildings.

From T. H. R., *South Fincastle, Ohio.*—I have patiently waited for "S. A. M.," of Fairfield, Texas, to give us further information with regard to moving buildings. As your correspondent kindly offers to contribute freely of his knowledge, I shall take the liberty of asking him to present sketches illustrating his method of moving buildings, and, at the same time, to lay before us all necessary particulars. This correspondent says, in the issue for August last year, that he does not use any windlass or capstan, but simply employs a span of mules or horses. I do considerable moving, and with a light building I employ one or two spans of horses or mules, using block and tackle and a hitch or anchor something like your correspondent "S. A. M." However, I sometimes wish to move a building that even two spans of horses, with the aid of a double or triple block and tackle, could not start. In such cases I anchor the same as though I were going to use horses, but instead use a windlass similar to those used on a derrick (a crab the machinists would call it). My crab has a 30-inch wheel on the spool-shaft and a 16-cog pinion on the crankshaft with long heavy cranks. This gives considerable leverage, but results in a very slow way of moving a building. I will describe my method of moving buildings as well as I can. I use common block and tackle rigging with four trucks (stationary), made as follows: There is a roller about 30 or 32 inches long and about 14 inches in diameter, with a groove cut in the center say, 7 inches wide and turned down to about 7 inches in diameter. I take a piece of square timber 6 x 7 or 8 inches by 30 inches long. In the center of one edge of this I cut nearly a half circle to fit over the roller crosswise and in the grooves already mentioned. This should not fit tight on the roller, but should stand about 2 inches above the roller when finished. Next I bore a 1-inch hole $2\frac{1}{2}$ inches from the top and directly over the rollar and put an iron spike in it, letting it extend about 1 inch above the bolster, with the upper end sharp pointed. The effect of this is, that when the sill of the building comes down on the bolster the point of the spike runs into the sill and keeps the bolster from slipping on the sill. The roller will turn in the half circle in the bolster. In my opinion with a heavy building there is altogether too much friction in a set of trucks made upon this plan. With a building not too heavy they are very handy, as they are always right at their place, and by using a maul they can be turned like the front wheels of a carriage, thus turning the building.

I use for a track to run on, 2 x 10-inch plank. These are sometimes 10, 12 or 14 feet long. They are laid side by side, about 8 or 10 inches apart, for a light building and doubled for a heavy building. I use different lengths of materials in order to break joints. If there are ditches or low places to cross I fill them up with anything that will answer the purpose.

Iron Ceiling Over Plaster.

From S. B., *West Alexander, Pa.*—I have a question that I desire to ask with reference to repairing a church ceiling. The church at present has a plastered ceiling and is finished with a plaster cornice

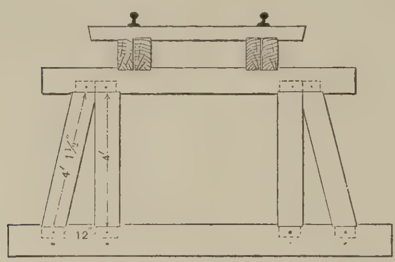


Cross Section.

at the angle of the walls. We think of putting in place an iron ceiling, but do not propose to change the surface of the ceiling. The acoustics of the room are as good at present as they can be, and what I desire to ask is, if there will be any danger of destroying the acoustics by using iron in the manner proposed?

Answer.—The acoustic properties of a room depend, for the most part, upon the proportions of the room and the general

shape, as controlled by the walls. If the iron ceiling is put in place without materially changing the size or shape of the



Trestle Construction.—Fig. 1 of Sketches From C. & B.

room, we see no reason why the acoustic properties should not remain entirely satisfactory.

Trestle Construction.

From C. B., *Virginia Bridge, Va.*—In the March number "T. D. W." asks about trestle construction. I will see if I

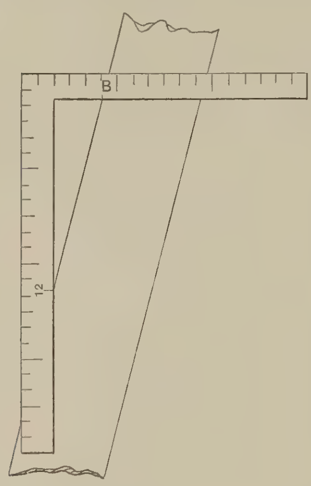


Fig. 2.—How to Use the Square.

can help him. I have seen batter posts cut 3 inches batter to the foot rise. In fact, I think this is the general rule with the roads in this part of the country. This would make the batter post for a

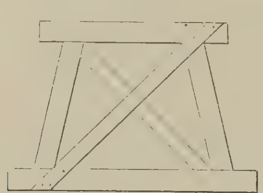


Fig. 3.—Trestle Used on B. & O. R. R.

1-foot vertical post 1 foot ⅜ inch. For a 4-foot vertical the batter would be 4 feet 1½ inches. Again, I have seen carpenters make a templet of light stuff, the hight,

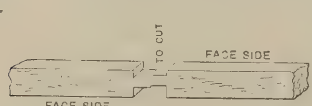


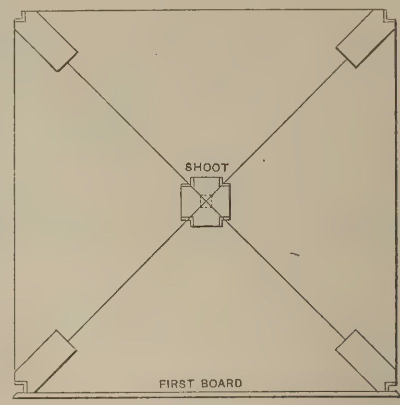
Fig. 4.—Suggestion of Framing.

or nearly the hight, of the highest bent and scale of the hight for the others with the straight edge across the bottom. A trestle of the kind, shown in Fig. 3 of my sketches, may be found on the Baltimore and Ohio road, at Locust Point, Baltimore. It answers all the purposes for the Lehigh Valley's funnel-shaped cars. If there is anything in this sketch that strikes the fancy of "T. D. W.," he is welcome to it. I would advise him to adopt the tenon method in framing, as it gives more wood and is simpler.

From C. E. W., *Quincy, Mich.*—Your correspondent, "T. B. W.," can find the length of his batter post in several ways. Using the square is a good way; but if he wants a method which requires the least amount of work let him take 12 inches on the blade of the square and the batter per foot on the tongue, and measure across from the two figures. This will give him the length of post for every foot of rise. Multiply this by the total rise to get the length of the post. To get the cut for either end place the square with 12 inches on the blade and the amount of batter per foot on the tongue on the stick, so that these figures shall each come exactly at the same edge of the stick. A line drawn along the tongue of the square will give the cut for both ends—that is, if joined on horizontal parts. If one or both ends are joined on perpendicular parts the line along the blade will give the cut. These rules, of course, apply likewise to rafters and braces. For a corner post or brace or hip, or for a valley rafter, for every inch of run add $\frac{5}{12}$ inch—in other words, for every foot or run or batter in a common post, brace or rafter, you have 17 inches in a corner post or brace or rafter, as the case may be, provided the structure has square corners. If the structure is of irregular shape, no matter what angles the corners are, it is necessary, of course, to know the hight to which the post is to reach, and also the run which it will have. Divide the run by the rise in feet. This will give the run or batter per foot. Proceed then as you would with a common post, rafter or brace. By the way I lay out such work it is not necessary to know the exact length of anything. All that is required is the rise and the run. Suppose I want to lay out a post to reach 40 feet, with a batter of ⅞ inch to the foot. I take 2 feet on the blade of the square and 1¾ inches on the tongue, and lay the square on the stick with these figures at the edge, and call that 2 feet in the length of the post. By laying off 40 feet in this way I have a post which will reach 40 feet high, and have a run or batter of 2 feet 11 inches. I get the cuts for either end in the way described above.

Construction of Hoppers.

From C. B., *Norfolk, Va.*—The article in the July issue of *Carpentry and Building* from "R. J. M.," on the subject of hoppers, reminds me of a job in the same general line that I had to do some time since. We were building a grain elevator, and the hoppers set on scales when built held a carload of grain. The sketch which I inclose will show the way we built them. It is scarcely necessary for me to remark that to the average carpenter who has never seen work of this kind such a job is not an easy one. Fig. 1 shows a hopper drafted on the floor. What I have marked "X X" represents pieces of board notched to receive the timbers "P" in Fig. 2. The post is set perpendicular with the floor and is braced solid, as shown by C. The cap the size of the passage is notched. The timbers are backed, rules for which can be found in various numbers of your paper published in the past. After backing, the timbers are dropped in the notches and then the planking can be started. After the work in Fig. 2 is finished it is set up as shown in Fig. 3. A straight section is added. The light of glass is to see if the hopper is discharged. The pocket comes next the scales. These hoppers were set in swing frames to heavy platform scales. The carrier timbers were canted on an angle as indicated. All the



Construction of Hoppers.—Fig. 1.—Plan View.

work was built under the supervision of a practical elevator builder.

Hand-Railing.*

From Jas. H. Monckton, *Brooklyn, N. Y.*—In your August number "J. H.," of London, England, submits a plan of

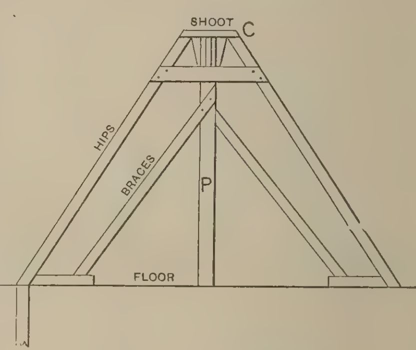


Fig. 2.—The Skeleton.

stairs, and writes: "The points I should like to see developed are the best way to treat the plan under the following condi-

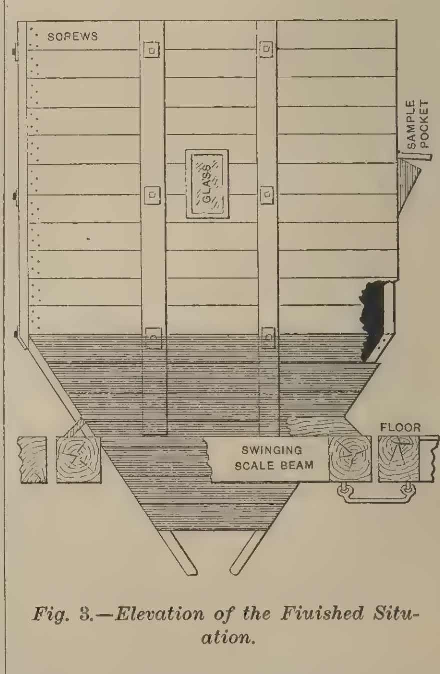
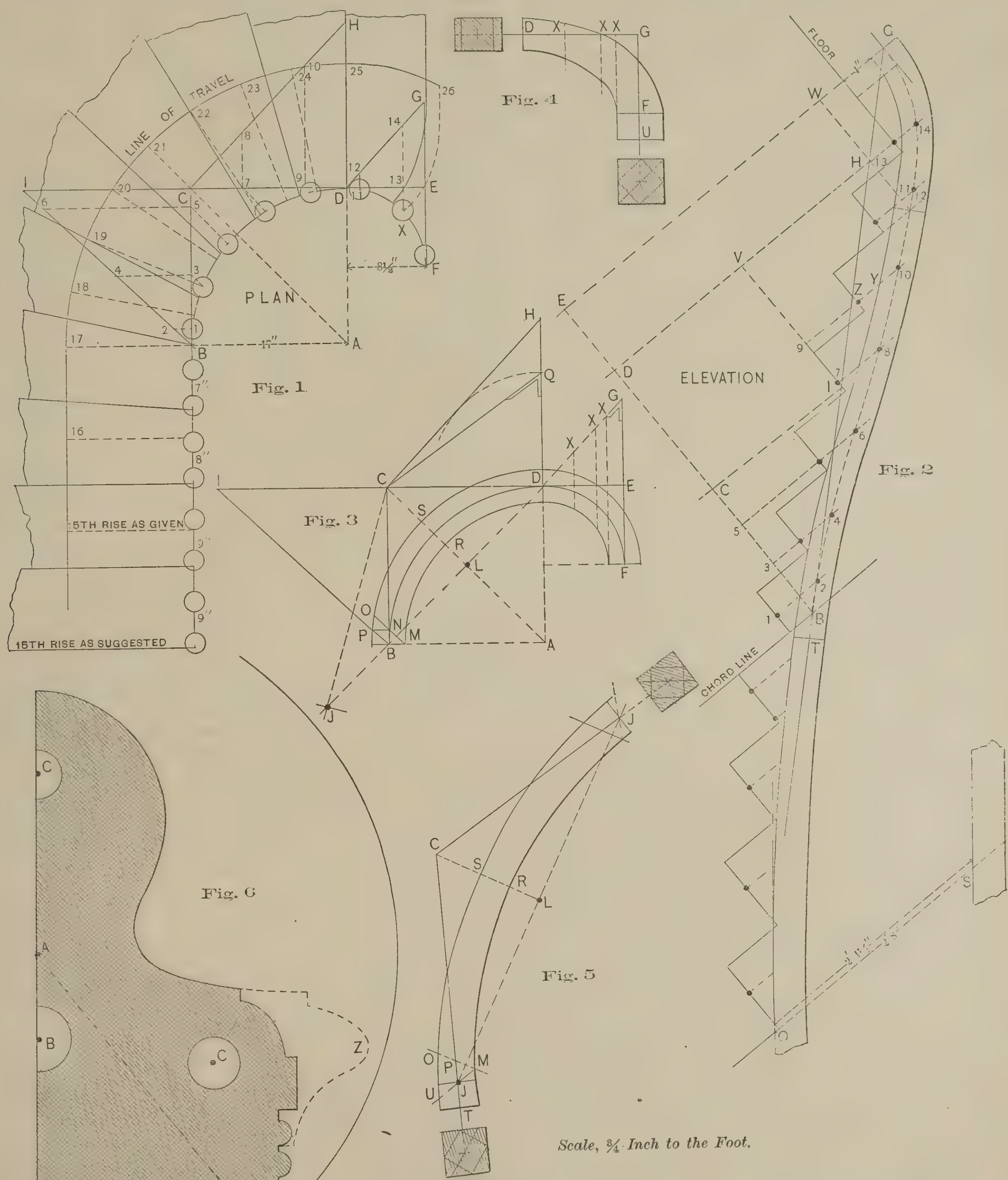


Fig. 3.—Elevation of the Finished Situation.

tions: The hight of rises 7 inches, width of tread 10 inches. The handrail 4½ inches wide by 3 inches thick. The level rail on the landing to be 3 feet from the floor to the top; and the rail over the

flyers to be 2 feet 8 inches to the top, measuring plumb above the face of the risers. The balusters are 2 inches, turned, one on each winder. The balusters on winders Nos. 19, 20, 21, 23 and 24 are to be the same length as the short balusters on the flyers. Where are the best positions for the joints?" In the October number treating the matter presented, I also expect to reach and probably benefit others among your numerous subscribers who have not given this subject that degree of study that by accident or circumstance has fallen to my lot. The plan given us by "J. H." is a bad one, it could hardly be worse; with the best proportioned tread narrow one of 6 inches, fit only for a step-ladder. Then, again, the 25th or last tread next to the landing—as if to make such an unpleasant arrangement still more palpable—is made equal to the regular flyers, 10 inches. Crowding eight winders in the first quarter of this mixed cylinder brings the wreathed rail up on a very steep



Scale, ¾ Inch to the Foot.

HAND-RAILING.—DIAGRAMS ACCOMPANYING COMMUNICATION FROM J. H. MONCKTON.

"J. H." makes a correction, and also furnishes a half section of the shape of his proposed handrail, concluding with a hope for a solution in an early number. I can hardly expect to please "J. H." perfectly in my treatment of his plan and requests; my aim will be rather to offer him that instruction which by his questions, the plan submitted, and the conditions imposed, he eems most to require. By this course, in and rise—10 inches tread and 7 inches rise—for the regular flyers, the plan changes at once to winders with narrow treads 3½ inches on the cylinder line and a tread of 6 inches on the line of travel. This natural line of travel in going up or coming down a stairs is about 14 inches from the face of the front string. Along this line of travel on the plan presented by "J. H." we step from the ample tread of 10 inches to a inclination, which for this reason ought to be made proportionately higher than the rails over the regular flyers, and not the same hight as asked for by "J. H." A further objection to this plan is that the regular flyers are placed right up to the commencement of the cylinder and for this reason, at about this point the steep inclination of the wreath in connection with that of the straight rail over the flyers

necessitates a quick, unpleasant easing. FIG. 1. — Plan of stairs given by "J. H."—The dotted lines from front string to line of travel, beginning at and marked 15th rise, as given, and numbered up to 26, together with the center line of rail at the regular flyers and as described at the cylinder, is the plan of "J. H." The amendment to plan as I have suggested brings the 15th rise lower down, and counting up gives 25 rises—one less than the plan of "J. H." This makes the hights of rises $7\frac{9}{32}$ inches. The tread is changed to 9 inches, for the reason that it is unqualifiedly better to make a uniform tread on the established line of travel in any prescribed run of a single flight of stairs. Surely there can be no gain or comfort in making two-thirds of a flight of stairs an easy tread and the other third as hard and difficult to travel over as a step-ladder. Such a plan is a menace, a danger to children and the infirm or aged. The improved plan suggested has six treads in the cylinder, each $5\frac{1}{4}$ inches, and on the line of travel all the treads in the flight are 9 inches; also, the two treads next below the cylinder are made 7 and 8 inches, to permit of gradually easing the straight rail into the lower end of the wreath, as shown by the ramp joining the wreath at T, Fig. 2. Just here it may be well to remark that a continuous flight of stairs with 26 rises is hard at its best, and ought to be avoided by making a plan, if possible, with a platform as a resting place at or about the middle of the flight. From 13 to 16 rises is as much as ought to be included in any one flight of stairs.

A few words as to the form of handrail given and intended to be used by "J. H." It is not a good *hand*-rail. I submit to "J. H." and other interested intelligent readers of this journal at Fig. 6 a half section (full size) of a more modern form of handrail; one that the hand of a lady or child can grasp with ease—a good *hand*-rail by reason of its small raised circular top. C C indicate places of hard-wood dowels, B the place of rail-screw. A wreath-piece over any curved plan and of any inclination may be worked out of a plank equal in thickness to the diameter of a circle the center of which is the center of the required form of rail, and its circumference embracing its outermost points —as follows: At Fig. 6 A is the center, A D the radius which describes the circumference of a circle, as shown, touching the extreme point or points of the given form of rail. Further, it is shown that the width of rail may be extended to Z and its shape changed to the form marked by dotted lines or otherwise, without any change in the thickness of stuff required for the wreath-piece.

FIG. 1. TO PREPARE THE PLAN FOR DEVELOPING THE CENTER LINE OF WREATH SHOWING THE EXACT RELATION OF WREATH TO THE UNFOLDED ELEVATION OF TREADS AND RISES; ALSO THE LENGTH OF EACH BALUSTER HOWEVER PLACED ON THE WINDERS.—Draw the tangent B C at right angles to B A, and the tangents C D E at right angles to A D, and the tangent F E at right angles to D E. Prolong F E to E G indefinitely; prolong A D to H indefinitely; also prolong D C to I indefinitely. Space the balusters as required. Draw the line A C, and from the center of each baluster in the quarter B D draw lines to the tangents parallel to A C, as at 3, 5, 7 and 9. Parallel to D H draw 9, 10 and 7, 8 indefinitely; parallel to C I draw 5, 6, 3, 4, and 1, 2 indefinitely. From the center of balusters X and 11 draw the lines 11, 12 and 13, 14 indefinitely, and parallel to E G.

FIG. 2. ELEVATION OF IMPROVED PLAN AND DEVELOPMENT OF THE CENTER LINE OF WREATH.—Set up the treads and rises from plan, Fig. 1, beginning with the rise marked 15th rise as suggested. Take the treads in the cylinder, each in two parts, for the purpose of getting more accurately the stretchout of the center line. Set off at any point from the chord line, and at right angles to it, the length of plan tangents B C, C D and D E; through C D and E draw lines as shown indefinitely and parallel to the rise lines. From the floor to G set up 4 inches and half the thickness of rail; from G draw the line G B. G is a fixed point, but at B the line may be raised or lowered at pleasure. Make E G of Fig. 1 equal W G of Fig. 2, and D H equal V H of Fig. 2, and C I equal C I of Fig. 2. Connect G D, H C and I B of Fig. 1. Again at Fig. 2, mark on each tread the place and center of baluster, as taken from plan, Fig. 1. Through the center of these balusters draw lines parallel to the rise lines indefinitely, and make the hights as indicated by corresponding numbers 1, 2; 3, 4; 5, 6; 7, 8; 9, 10; 11, 12 and 13, 14 of Fig. 1. Through G 14, 12, 10, 8, 6, 4, 2 and B trace the unfolded center line of wreath. Half the thickness of the rail is traced each side of the center line. To find the length of any of these balusters—say, for example, the one marked Z: measuring $3\frac{1}{4}$ inches from Z to Y, add this measurement to the hight of the short baluster on the regular flyers, 2 feet $4\frac{1}{2}$ inches, then the length of this baluster will be 2 feet $7\frac{3}{4}$ inches at its center line, and from top of step to underside of rail.

FIG. 3. PLAN OF HAND RAIL WITH THE TANGENTS TO THE CENTER LINE, THE HIGHTS AND INCLINATIONS LETTERED ALIKE AS TAKEN FROM FIG. 1.—Parallel to F E, the level tangent, draw the dotted lines, as shown, touching X X X. Through B draw the line D J indefinitely; with I B as radius on C as center describe an arc at J; parallel to A C from M draw M O; at N draw N P parallel to C I. To find the angle with which to square the wreath-piece at the joints over B and D: On D as center describe an arc tangent to the line C H and touching Q; connect Q C, then the bevel at Q contains the angle required.

FIG. 4. FACE-MOLD OVER LANDING QUARTER FROM PLAN OF RAIL, FIG. 3, ALSO SHOWING THE SQUARING OF THE WREATH-PIECE AT THE JOINTS.—Draw D G and G U at right angles; make G F equal E F of Fig. 3; make G X X X and D equal the same at Fig. 3 and draw lines through X X X and D at right angles to G D. Take all measurements each way to the curve from the line E D, Fig. 3, and set them off from the line G. D. Make F U equal 3 inches for straight wood to join the straight level rail. The joints at U and D are made at right angles to the face of plank and at right angles to the tangents F G and G D. At center joint D, the sides of the rail are made at right angles to the face of the plank and the overwood is removed equally from each side, as shown. The bevel used to square this wreath-piece at joint U is from G, Fig. 3.

FIG. 5. FACE-MOLD FROM PLAN OF RAIL, FIG. 3, OVER THE QUARTER CIRCLE B D; ALSO SHOWING THE SQUARING OF THE WREATH-PIECE AT THE JOINTS.—Draw the line J J indefinitely; make L J and L J equal to the same at Fig. 3. At right angles to L J draw L C equal to L C of Fig. 3. Connect C J and C J, make J T for straight wood equal to B T at the ramp, Fig. 2. Make J P at both ends equal B F of Fig. 3, and through P draw M O parallel to L C; make P M and P O equal N M and N O of Fig. 3; through J draw M U, make J U equal M J; make L R S equal the same of Fig. 3. Through the points of the curves thus found bend a flexible strip and mark the curved edges of the face-mold. The joints are made at right angles to the tangents; also these joints of the wreath-piece are made at right angles to the face of the plank. The angle for squaring the wreath-piece at the joints, as shown, is taken by the bevel Q, Fig. 2.

It will be seen by the unfolded center line of wreath, Fig. 2, that its hight at its greatest point of difference (measuring along the line of riser as at Q) is about 2 inches more than the hight of the straight rail at Q S; there can be no objection to this, for, as before remarked, it is desirable in any plan of a winding stairs similar to this that the wreath be somewhat higher over the winders than that fixed over the regular treads.

Grading of Lumber.

From A. C., *Cincinnati, Ohio.*—In grading white pine lumber, such as is used in housework, how many grades are recognized, and what qualities do the several grades need to possess in order to secure their classification? I have encountered different opinions on this subject, and would like to see it discussed in *Carpentry and Building.*

Answer.—The grading of lumber is something in which every carpenter and lumber producer, as well as lumber dealer, is vitally interested. Unfortunately for the kind of an answer that our correspondent would, undoubtedly, be glad to have to the question he presents, the grading of lumber is an uncertain kind of business. The grades differ from time to time, and the grading in several different cities does not necessarily agree in all particulars. What is known by one name in New York or Boston, for example, may be known by another term, if not included in another class, in Cincinnati or Chicago. From time to time lumber dealers in their district and national conventions agree upon grading regulations, and, in turn, these regulations are varied as the exigencies of the market or the productions of a given district seem to warrant. We have scarcely space to enter into an exhaustive discussion of the subject, and therefore suggest for the benefit of our correspondent, to whom only local gradings can be of any especial advantage, that his best plan is to obtain from an honest and reliable dealer in lumber the classification which prevails in his market. If any of our readers have anything to say in answer to this question, we shall be glad to hear from them.

Size of Chimney.

From J. M. C., *Woonsocket, R. I.*—I desire to ask if a chimney flue, 8 x 12 inches, will be large enough for the use of two families who employ four stoves, all told, all being fitted with $5\frac{1}{2}$-inch pipes? Two stoves will be upstairs and two downstairs.

Answer.—Our correspondent opens up a very important question when he enters upon a discussion of the size of chimney flues. So far as capacity is concerned, certainly a flue 8 x 12 is sufficient for the number of stoves that he mentions, but whether an 8 x 12 flue will work under the conditions described is altogether another matter. Flues sometimes work well when it would seem that they ought not to perform at all; in other cases, they stubbornly refuse to work when it would seem that the conditions are favorable. We take it that our correspondent has a two-story house in mind, occupied by two families, one on each floor; that the chimney is central, and that it is desired to use the one chimney for all the stoves. If the stack was built so as to provide four flues, there would be very little doubt about the apparatus working satisfactorily. With a single flue, we could not guarantee it. In a portion of the letter which our correspondent sends us, which we have not thought it necessary to print in full, he

asks about the pipe-holes coming opposite each other. This can be avoided, and the annoyance of smoking somewhat overcome by carrying from each pipe an elbow extending upward for a few inches or a few feet, as the case may be. While our correspondent may be able to do the work with a single flue, we should advise against the plan if some other can be substituted.

Transmitting Power.

From J. F. W., *Danville, Pa.*—I notice that one of the readers of *Carpentry and Building* wants some information with regard to transmitting power from one building to another. I refer to the communication from "C. F. S.," Trenton, Tenn. I inclose a sketch which may be of interest to your correspondent. It will be noticed that the wire rope passes over large sheaves or grooved pulleys, placed on the top of the building. This is for the purpose of causing the rope to clear the street. The same construction is followed on the opposite side, and the wire rope after passing over these sheaves is conducted downward to the line shaft in the second building. The rope recommended for the purpose is of either steel or copper wire as may be desired. Care should be taken in supplying rope for such a purpose to secure one with a hemp center, to increase the durability of the rope. The range of rope adapted for uses of this kind is comparatively small, varying from ⅜ to ⅞ inch in diameter, and from 200 to 300 horse-power may be transmitted. For the smaller powers it is advisable to use a larger rope than is absolutely necessary, in order to secure wearing capacity. Nevertheless, a large rope is heavier than a small one, and accordingly some power is lost in bending it around the wheel. A ⅞ inch rope having the same velocity as a ⅜-inch rope transmits less power than the latter, simply because of great stiffness. The wheel should be made of the best material, very carefully balanced, and finished with a deep flaring groove, the depth and width of the groove depending upon the length of span and whether or not the rope is subject to side tension.

Batter Posts.

From H. B. A., *Atlanta, Ga.*—Please inform me of the best method of getting the length of batter posts for trestles. I am to take charge of building a number of trestles, and never having had the opportunity of learning the art of bridge building I am at a loss how to proceed.

Note.—Such a problem as our correspondent calls up resembles the rafter problem which has been largely discussed in our columns for some time past. The inclined posts of trestle-work may be compared to rafters of a very steep pitch; the corner posts would resemble the hip rafters and the intermediate posts the common rafters. With this much of a suggestion of how the work may be managed, we refer it to our readers for such discussion as they may see fit to give it. Some time since we discussed in these columns what was then called a Tank Problem, being the supporting framework for an elevated tank, in which the bevels, cuts and angles were all considered. If our correspondent has the volumes for 1879–80 he will find considerable information on this subject. Some of the articles in this issue bear upon the question.

Water Pressure in Tank.

From R. N. C., *Anastasia.*—In your Correspondence Department will you please inform me whether I was correct in a statement that I made to several intelligent men in regard to the pressure of water? I am about to build a cistern 6 x 10 feet and 5 feet wide, and which I wish to divide in the middle with a brick partition. The parties that I was talking with stated that by so doing the water pressure would not be so great in the divided tank as it would be if the water was in one body. I held that the pressure would be exactly the same, whether the partition was in the center or within ½ inch of the side—or for that matter, if the tank was as broad as from here to Europe. I may further add that only one part of the tank will be filled with water.

Answer. — We presume, undoubtedly, that our correspondent has referred to the pressure of water at the bottom of the tank or the pressure in a pipe carried from some part of the tank, and does not mean the total pressure exerted on the sides or bottom of the tank. In the latter case, of course, the volume of water would increase the total pressure. Assuming that the tank is to be elevated and the pressure measured on a pipe drawn from some portion of it, our correspondent is correct in the statement he made—that the pressure was only dependent upon the depth of water. This is an hydraulic principle that too many people forget—namely, that the pressure of water on a given area is solely dependent on the hight of water, or hydraulic head, as the term is, and is not affected in any way by the expanse.

Brick for Foundations.

From J. M. C., *Woonsocket, R. I.*—Will hard-burned brick answer as a foundation for a two-story house and French roof? The foundation outside is 30 x 46 feet, extending below the surface of the earth 6 feet. My idea is to have a foundation of hard-burned brick to be 12 inches up to within 2 feet 6 inches from the sill and then 8 inches thick to the sill. The soil in and around the foundation is of a dry nature. Will it answer to use the brick where the soil is rather damp? Does a damp brick wall get rotten if used as a foundation for a house of the size named above?

Note.—The use of brick for foundation purposes is almost universal in certain parts of the country, particularly where stone is not abundant. Success depends entirely upon the quality of the brick, the care with which it is laid, and last, but not least, upon the character of the cement used in laying the brick. It is very extensively used for foundation purposes in and about New York. The foundations of the piers for the elevated railway structures are of brick. Perhaps our readers will be pleased to discuss the question which this correspondent proposes.

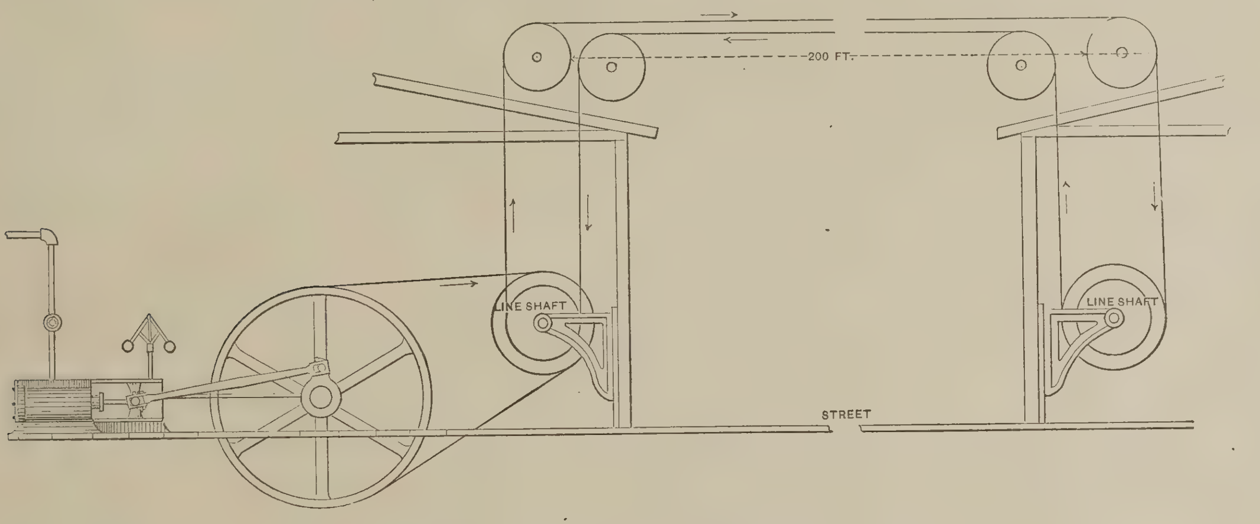
O G Rafters.

From R. G., *Buffalo, N. Y.*—I would be under obligations if some of the readers of *Carpentry and Building* would explain, by drawings, the simplest and most accurate method of obtaining the angle rafter in an O G in a square ventilator, so as to line with the common O G rafter.

Answer.—This question was very fully discussed in some of the back volumes of *Carpentry and Building*, and, at the time, a large number of diagrams were presented. We submit the questions again, thinking that some of our readers may be interested in it at the present time and that further consideration will be of advantage accordingly. The problem, as heretofore discussed, has been variously presented, convex and concave roofs of a single curve being contrasted with those of a double curve, or O G in form. The principle involved is the same.

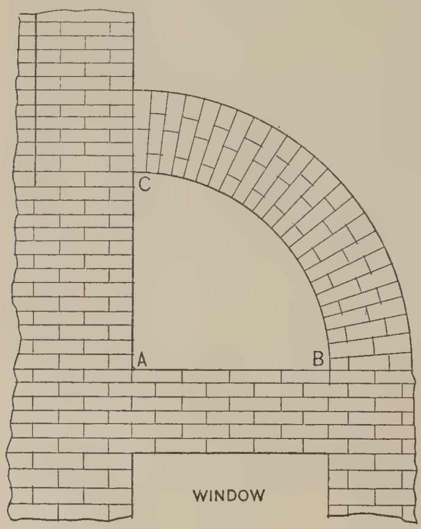
Some Transferred Chimneys.

From Tin Chips, *Chicago.*—Some of the houses in this city that are three or four stories in hight have the kitchen only one story above the basement. This arrangement gives the chimney expert a chance to show his skill, for if the kitchen chimney is not as high as the surrounding buildings there is certain to be some kind of a wind that will take advantage of the circumstances or the chimney and blow every bit of the smoke out of the range into the room, or prevent the range from drawing as a good range should. It is interesting to a chimney doctor to notice how some of the difficulties have been overcome. Fig. 1 shows one way of connecting a chimney



Transmission of Power.—Diagram Accompanying Letter from J. F. W.

on a low building with another on a high one. The drawing is not made quite as the chimney is built, as it is about 12 feet from A to B, and one story from A to C. It is presumed that the range stands to the right of the window, and as it would not



Transferred Chimneys.—Fig. 1.—An Arched Connection of Brick.

be convenient to have a tall chimney for the range, said chimney is carried over to the chimney in the main building. It would appear from the looks of the

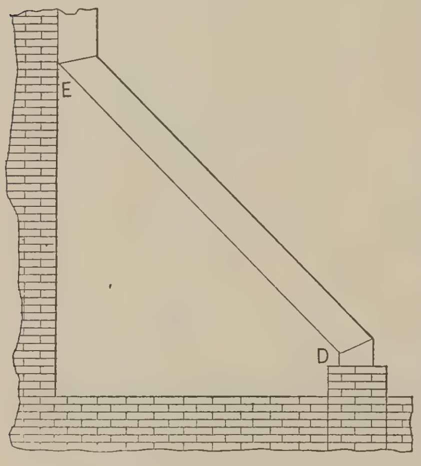


Fig. 2.—A Pipe Connection.

building that this arrangement was carried out when the building was built. The effect of the half arch is quite pleasing to the eye, and it does not look

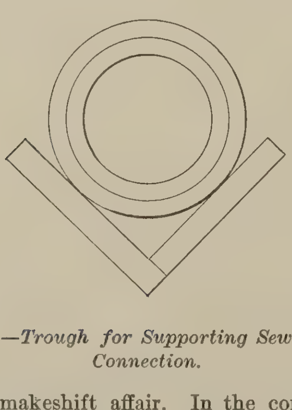


Fig. 3.—Trough for Supporting Sewer-Pipe Connection.

like a makeshift affair. In the construction of such a chimney it might be well to have a drawer at C, so the upright chimney could be cleaned out from the outside of the building. The outside of the drawer could be painted the same color as the brick. Fig. 2 shows an arrangement that without doubt the reader is familiar with, the connecting pipe being made from galvanized iron, and carried above the top of the building. On another block of buildings the chimneys were extended as shown by Fig. 2, only sewer-pipe was used in place of that made from galvanized iron. To support the pipe from D to E it was laid in a trough, as shown at Fig. 3.

Modern Elevators.

The proprietors of the *Tribune* building in this city have recently placed in position in that structure two improved passenger elevators, and the *Tribune* takes occasion to refer to them in the following strain:

There was a time when the lumbering stage-coach was considered a fine example of the rapid strides of civilization, but its usefulness was short-lived at best. There was a time, too, when men were glad to avail themselves of the convenience of an elevator of the rudest type, a heavy, clumsy platform which was pulled up to the top of a building by some sturdy boy. Three passengers was a big load, and the trip to the top of a nine-story building, had there been such buildings in those days, would have discouraged the most patient or lazy of men. Improvements in the speed, capacity and convenience of elevators kept pace with those in other things, and still the hurrying, scrambling, eager people of this plunging age called for greater conveniences. Business men had to content themselves with offices high up in the air, and a minute saved in getting to or from them was a minute of valuable time gained.

The two hydraulic passenger elevators which have recently been placed in the *Tribune* building give a striking example of the attention that is paid nowadays to the needs and convenience of an impatient, restless public. In appearance they are most pleasing. Light and airy, the whole car except the floor being made of light ironwork, they give one the sensation experienced in making a balloon ascension. The plate-glass mirrors in each of the four corners of the car, the electric lights with their tinted shades and the oaken floors give them a touch of luxury. The speed reached by the cars is exceedingly rapid. The maximum rate is 500 feet a minute, but the cars are generally run at the rate of about 400 feet a minute, owing to the frequent stops. The "hoist" from the bottom to the top of the *Tribune* building is 104 feet, so that the trip may easily be made in 20 seconds. When one is making a trip from the lower to the upper landing without a stop the experience is something like this: A closing door, a shoot upward, an opening door, and a stereotyped voice saying "Nine."

The maximum weight carried by each car is 3000 pounds. There is not the slightest danger of a car falling down the shaft owing to the giving way of the cables, for the four hoisting cables have a lifting capacity of 11,000 pounds each. To insure fuller freedom from accident, two of these are slightly slack, so that there is no strain upon them, and, should the other two possibly become worn out, and thus be suddenly parted, there would still be two unused cables, with a lifting capacity of 22,000 pounds, to hold a weight of only 3000 pounds. Should everything give way, however, the car could not drop, for its speed is regulated by an automatic governor placed on its top. If the speed of the car should exceed 500 feet a minute, the governor snaps a spring and the car is instantly brought to a standstill by two automatic grips, which seize the guide-posts.

The car is not operated by the old-fashioned hand cable running through the car, but by means of a lever. This is held constantly by the operator, who thus has the car under perfect control. In connection with the lever is an auxiliary valve, by means of which the water pressure is so directed as to operate the main valve. In addition to this appliance, there is fixed to the machinery an independent automatic valve, which stops the car at the terminal landing by itself. By this means there is no possible danger of a car full of people being shot up through the ceiling as from a catapult, in case the operator becomes confused or careless.

There are two water tanks for the supply of water. The upper one has a capacity of 3000 gallons, and the lower one of 3700. With the valve in the steam pump is connected an automatic float, which controls the supply of water to the upper tank. As a further prevention against accidents, the discharge pipe is supplied with a syphon relief valve, which stops the car instantly if any obstruction to its progress is met.

With all the precautions taken for the safety of passengers, their comfort and convenience have been looked after with equal care. An automatic stop-valve prevents the operator from stopping the car with a sudden jerk. Furthermore, that no efforts might be spared to add every possible thing to their convenience, the ordinary perpendicular cylinder of elevators, which gives out a hissing sound, has been replaced on these cars with a noiseless horizontal cylinder attached to the bottom of the car. These cars, which are made by the Crane Elevator Company, have been placed in position and put into perfect working order under the personal supervision of Edward L. Raht, the Tribune Building architect.

Why Mortar Hardens.

In writing upon this subject G. R. Burnell says:

Until very recently it was held by most engineers and architects, by myself among others, that the solidification of mortars took place in consequence of the absorption of carbonic acid gas by the lime during the process of crystallization; but it has been fairly objected to this theory, that the quantity of carbonic acid gas contained in the atmosphere which could be brought into contact with a large body of cement would not suffice to saturate the latter. The generally received opinion on the subject now is that limes harden simply in consequence of the combination with water which takes place during the slacking, and that the rapidity of the setting, and the permanence of the newly formed hydrate of lime, depends upon its being combined with some other salt; the pure hydrate of lime, in fact, is soluble; the hydrated silicate of lime is tolerably insoluble, but it forms slowly; while the hydrated double silicate of lime and alumina, or of lime and magnesia, are practically insoluble. The facts actually observed seem to confirm these views, and they certainly enable us to account for not only the different modes of setting observable in different limes, but also for some of the more gradual actions which take place in that material, and the effects reciprocally produced by the mixtures of various ingredients. In the case of the now generally used Portland cements, and in that of underburnt lime, some very curious phenomena may however be observed, which appear to indicate that the simple laws mentioned above do not comprehend all the conditions which may arise; so that the above theory itself must only be considered as a step toward the attainment of a complete one of a more general character. The phenomena to which I thus allude are connected with the obscure subject of the chemical actions which take place under the influence of high degrees of temperature.

NEW PUBLICATIONS.

NOTES ON THE ART OF HOUSE PLANNING. By C. Francis Osborne, Architect, Assistant Professor of Architecture in the Cornell University. Cloth; size, 5 x 7½ inches; 106 pages. Published by William T. Comstock. Price $1.

This work embodies a portion of the notes used by the author with his classes in architecture at Cornell, and were originally printed in the columns of *Building*. The author, finding that they had apparently encouraged the cultivation of a field practically untouched as to detail, issued the notes in book form as a stimulus to the younger generation of architects to embody in their work the principles of good planning. In this book only the simplest elements are set forth, as to extend the investigation of the subject would tend to defeat the purpose of the author. Illustrations are freely employed throughout the pages and greatly assist the reader in grasping the author's ideas. The introductory chapter deals with the general subject of planning, which is described as the act of so shaping and disposing the various interior divisions of a building that it shall best serve the uses of the occupants for whom it is designed. The author tells how to proceed in laying out the plans for a house, dwells upon the skeleton or outline and presents a chapter upon the entrance, which he considers as composed of three parts, the porch, vestibule and the entrance hall. Chapters are also presented devoted to the dining-room, drawing-room and parlor, library, kitchen, billiard-room, and bedroom floor.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. Serial. Size, 11 x 14 inches. Published monthly by William T. Comstock. Price, $5 per year; 50 cents per copy.

Readers of *Carpentry aud Building* will remember that the first volume of this work was brought out by the publisher as a book of details, and was issued in parts at intervals of from six weeks to two months. The publisher has been led to issue a second volume of the work, which will give attention to a great variety of low-priced designs of cottages, houses, barns, schoolhouses, chapels, &c., together with exterior and interior details carefully drawn to scale. These will include gables, porches, bay-windows, mantels, doors, wainscoting, ceilings, and other details likely to be found of interest to those engaged in the building trades. The work will be issued monthly, in parts, each number containing not less than six carefully prepared plates, accompanied by ample descriptive letter-press.

TOWN AND COUNTRY SCHOOL BUILDINGS. By E. C. Gardner, Architect; cloth, 141 pages. Illustrated. Published by E. L. Kellogg & Co. Price, $2.50.

The writer of this work is the author of several interesting volumes relating to structures of different kinds and is too well known to our readers to require any introduction at this time. The work referred to above consists of a collection of plans and designs for schools of various sizes, both graded and ungraded, together with descriptions of construction of sanitary arrangement, light, heat and ventilation. The evident design of the author is to render more popular the technical requirements of model schoolhouses, and to assist teachers in explaining to building committees and others in authority the possibilities and the duties in regard to structures intended for school purposes. Illustrations are freely used, wherever desirable, to more clearly explain the author's views and many interesting bits of detail are shown which add to the value of the work.

PRACTICAL CALCULATOR.

D. HEPP, HECLA, DAK., sends us specimens of his "Lumber Dealers' and Builders' Calculator," which he has recently copyrighted. The matter is printed on a manila card and is arranged in three principal divisions, running the depth of the sheet. Each of these is subdivided into ten small columns for amounts, being the quantity of material in any number of pieces from 1 to 10 of the specified dimensions, which are noted at the left of each of the principal divisions. For instance, 2 x 10 joists are figured in this way, for various lengths ranging from 10 to 28 feet each. Under the heads of the number of pieces already referred to is found the quantity, board measure, contained in the number of pieces specified of the sizes named and of any given length. For example, we read by the table that five piece. 2 x 10, 20 feet long, contain $166\frac{8}{12}$ feets For any quantity of pieces above ten, the amount is obtained by multiplication or addition. For example, if 11 pieces are wanted the sum of 5 and 6 may be taken; if 25 pieces are wanted it would be 5 times 5, and so on. Larger timber can be figured in a similar manner by multiplication. For example, 10 x 10 is 10 times 2 x 5, 8 x 10 is 10 times 2 x 4, and so on. Various short cuts that are possible with the table are explained in the directions given for its use. The back of the card has a table of board measure; a rafter table; a brace table; table of timber measure and a table of bricks for chimneys of different sizes. Various rules and recipes are also presented.

Sticking Lumber.

Builders are interested in lumber that has been properly handled before it comes into their possession to be workod. A writer in the *Lumber Trade Journal* makes the point that there is not a mill man in the country who cannot tell just how to stick lumber in the best manner and when to stick it. On the other hand he asserts that when the lumber is marketed it shows that some one has made a grave mistake, especially in the case of poplar and light-colored lumber. In sawing poplar, when it is green with sap, it should be stuck up at once, as if left piled together it will "sap color" in a few hours. "Haven't time" will not answer! If you care to get the full value of your lumber you must stick it up as fast as sawed. This is true of oak, and, in fact, of all lumber affected by sap. Lumber manufacturers often wonder why their stock is not bright and nice as some they have seen. If these same men continue to saw their lumber and pile it close together and leave it until they have time to stick it up then I can assure them they will spend the rest of their days wondering. This should be the order in importance with them—first, how to keep the lumber bright; then, next, how to saw it properly. Use narrow strips, and under no circumssances may they be green, as they will most certainly color the wood wherever they touch, and if left too long will rot it. If you have no dry sticks and are on a railway line buy a carload and run them to your mill; it will be money well spent, and the first sawing you do let it be on a good supply of sticking lath, which will soon be dry enough to use. Walnut should be piled together as soon as sawed and will receive no injury if not stuck up for some time after sawing. The sap seems to dry out faster when finally the lumber is put on sticks than if stuck right from the saw. If you have plenty of mill-yard room pile your lumber thus: Set the piling blocks at least a foot from the ground and with sufficient fall to let the rain run off readily when the pile is finished and covered. Begin by laying the first course with the boards, say, 6 inches apart if wide, and the narrow ones put two together and build the pile in this order, so that when finished the spaces started in the first course will run to the top of the pile. The openings will be so many chimneys, drying out the lumber more in one month than in three months the old way. Start the next pile at least 20 inches away, and so continue covering your yard and you will be surprised how soon you can begin shipping dry lumber. One point more in the sticking of lumber in which there are sappy boards; instead of placing these boards away in the center of the pile they should be put on the outside as far as possible, so that they will get the more air, and, again, these boards should be laid with the sap side down.

Best Effects in Wall Paper.

Bedroom.—Small figured light paper, touched with gold, and a border not too dark for the walls. For the ceiling, a single point or delicate tint with small figure. If stile and decoration are used, the effect is better to match the color of the decoration and side-wall border as closely as possible. The stile may be a trifle darker than the center.

Dining-Room.—Lincrusta-Walton, leather, or if something cheaper is desired, some imitations of these are very good. This room can bear, and will be improved by a much heavier finish than most others. Paneled ceilings, with corners or squares containing game or fruit pieces, trimmed with binders or wood moldings, are handsome and popular. A well-covered center is serviceable for the ceiling. If a dark carpet is used the paper should be at least three shades lighter. Never put on a Pompeian shade of paper with a bright red or maroon ground carpet, as one color kills the other.

Library.—The most *recherché* style for this "heart of the house" is Pompeian red paper, with frieze of gold or yellow figures, and copper molding for hanging pictures under it. A ceiling with center of light buff, stile of mustard-yellow, decorations of Pompeian red, or blue and gilt with figures of the opposite color on it; cornice in tints of Pompeian red, yellow, mustard and blue.

Hall.—The prettiest and most desirable papers now in use for our halls are geometrical figures in light colors and gilt. A very popular shade nowadays is called "biscuit" (just the color we like to see our soda-biscuits as they come smoking from the oven). It is used with a frieze of flowers, or a Persian design matching the side-wall in color.

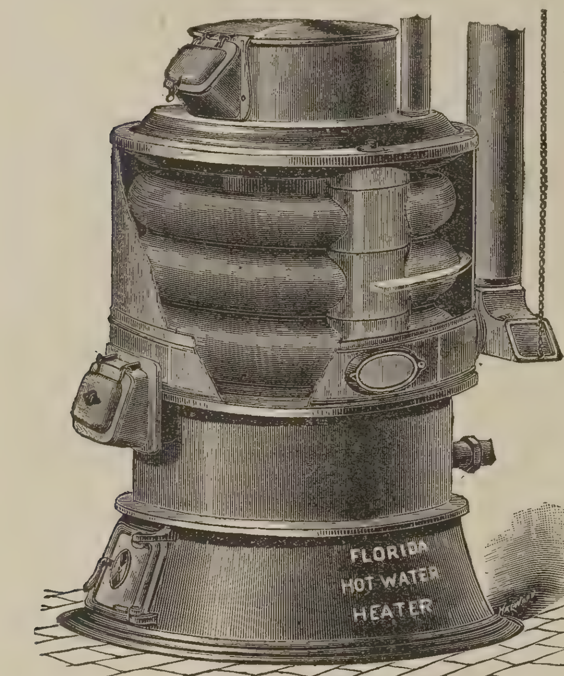
Parlor.—This, of course, is the best room in the house, usually, and should have the best paper, and the majority of people will be more particular with this than any other room. A good plan is to go by the wood-work—as, for instance: Maple wood—use a yellow, wavy-colored paper with a ceiling paper of a bluish tint and a little gilt. Cherry, natural or colored—use old-gold paper or "metals" for side-wall, and blue or white ceiling. Mahogany—a light terra-cotta pink for side-wall, and a paper for ceiling with a light silver-green metal in it. These suggestions are the best for the parlor, as in this room especially the colors should harmonize. One very important thing in this room is a frieze, as it bears the same relation to a side-wall as a cornice does to a house. It should give dignity to a room and should be wide enough to admit of ornament that will not seem cramped or insignificant when seen from the floor.

If the ceiling is 9 feet high use a frieze of 8 or 9 inches wide; if 10½ or 11 feet, you can use a frieze of 15 or 18 inches in width. Do not use a conventional design above a wall paper whose pattern is flowered, or *vice versa.*

STEAM AND HOT-WATER HEATING.

The Florida Hot-Water Heater.

The growing demand for hot-water heaters has lead the Pierce, Butler & Pierce Mfg. Company, Syracuse, N. Y, to devise an apparatus of this kind, which they are putting on the market under the name of the Florida hot-water heater, general and detailed views of which are shown in the accompanying cuts. The Florida heater is of the magazine stove variety, the fuel opening being at the top, as shown in Fig. 1. It will also be noticed by the same illustration that the heater is composed of three sections, bolted together. A separate view of one of these sections is shown in Fig. 3. In Fig. 4 a broken view is presented, showing the manner in which the water circulates. The grate of this apparatus is the same as that used in the well-known Florida steam heater. The heat passes from the combustion chamber up over the top sections and down around the outside of them, where it enters the flue leading into the chimney, thus entirely enveloping the water sections. The heater is not brick-set, but is enveloped in a three-ply non-conducting jacket, made of sheet asbestos between two sheets of iron—the inside one black and the outside one galvanized. These three sheets are bolted together and held in position by band and draw screws. From the shape of the sections it will be noticed that there are no flat, horizontal surfaces upon which the dust or ashes would be liable to lodge. The manufacturers state that their heater is constructed on what is known as the "belt" principle, which, it is claimed, gives the best results of any construction. At the base of the heater, as shown in Fig. 1, is an ample door opening through the casing underneath the grate. The further regulation of the draft is obtained by means of the check-draft door at the base of the smoke-flue connection. Sizes A, B, C, D, E and F of the Florida heater are built of single direct circulating sections, like the one shown in Fig. 3. These sections are placed one above another, the water circulating across the front half and across the back half in its upward course from section to section. The five larger sizes of the heater are built of double direct circulating sections, as shown in Fig. 2, the interior sections being of smaller diameters than the outer ones. The water circulates independently through the inside and outside sections, and the partitions in each waterway direct the course of circulation, so that no two currents come together. The same manufacturers also make a double heater of the double circulation type, similar to the double Florida steam heater. Fig. 4 is a broken view of sections of the Florida hot-water heater, showing the partitions in the waterway which direct the current of flow across the front or back of each section, the direction of the current being indicated by the arrows.



Florida Hot-Water Heater.—Fig. 1.—Heater with Jacket Partly Removed.

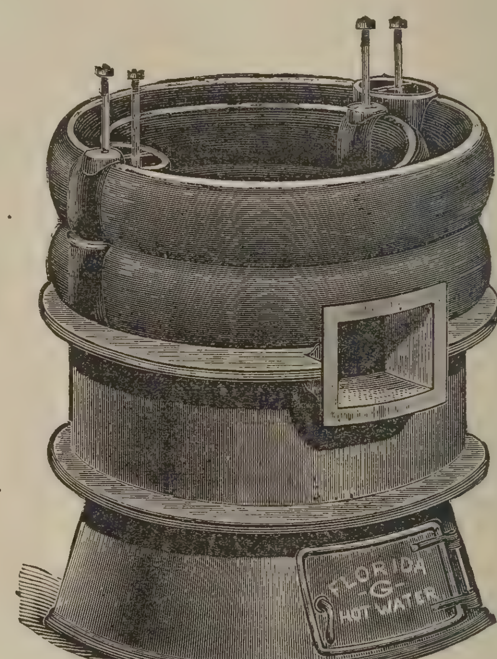


Fig. 2.—Large Heater with Double Sections.

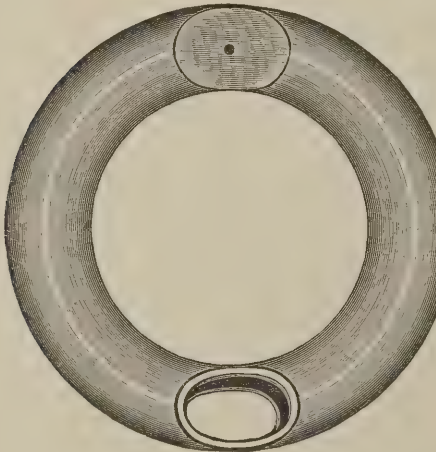


Fig. 3.—Single Circulation Section.

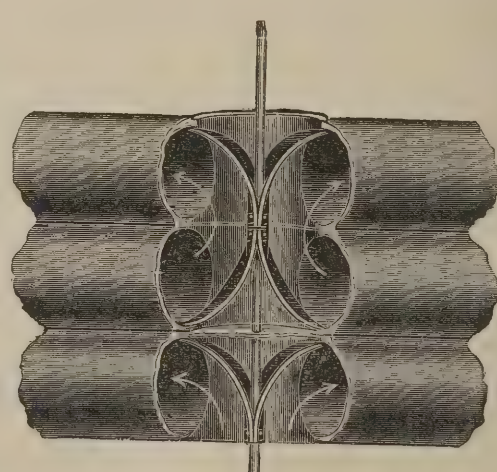
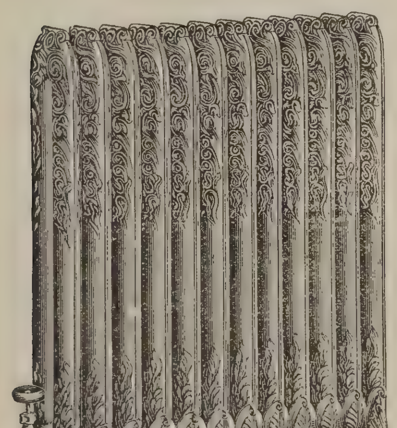


Fig. 4.—Broken View of Sections.

The Perfection Steam and Hot-Water Radiators.

The increasing popularity of the systems of warming buildings by steam and hot water is perhaps manifested as plainly by the new styles and varieties of radiators as by the enlarging number of heaters. Among the latest designs of the former is the Perfection radiator, which the Michigan Radiator and Iron Mfg. Com-

pany, of Detroit, Mich., have just brought out. The special features of this radiator, a side and end view of which are shown in the engravings, are the style of decoration and the manner of connecting the loops. It is the idea of the manufacturers to produce a radiator loop of appropriate design and conforming with the most advanced ideas in the artistic decoration of iron surfaces. By inspection of the engravings it will be seen that this purpose has been well accomplished, the bottoms of the loops carrying a representation of flame, while the conventional design of the upper ends is intended to give out the general effect of smoke. Furthermore, the shape of the loop is graceful, and the supports are in keeping with the whole construction. The radiator illustrated is for steam, but those for hot water have the same exterior appearance except that the upper ends of the loops are also connected similarly to the lower ends, as shown. The Perfection radiator conforms to the latest ideas, and it dispenses with the old-fashioned removable tops, as well as the projecting base. As the manufacturers state, not only are these attachments condemnable for artistic reasons, but also, as is pretty generally admitted, they are objectionable on the score of efficiency. According to the construction of these radiators, a large opening for the passage of steam and hot water is obtained. The loops of the radiators are screwed together with right and left nipples, made of steel, by which process, it is stated, the loops are drawn tight together and firmly held in place, the face of each loop at the point of contact being milled perfectly smooth and true. No packed joints are used, nor joints of any kind which require bolts or rods to hold the loops together. The supply and return openings are adaptable to any of the different systems of pipings now in use. Wrenches are furnished by the manufacturers with which the radiators can readily be increased or decreased in size by the addition or subtraction of one or more loops. According to the table printed in the manufacturers' circular, the sizes of these radiators vary from 2 to 32 loops, having a length of from 5 to 80 inches, a uniform width of loop of 7¼ inches, and a uniform width across feet of 9½ inches. The hights of the radiators are 45 inches, 38 inches, 32 inches, 26

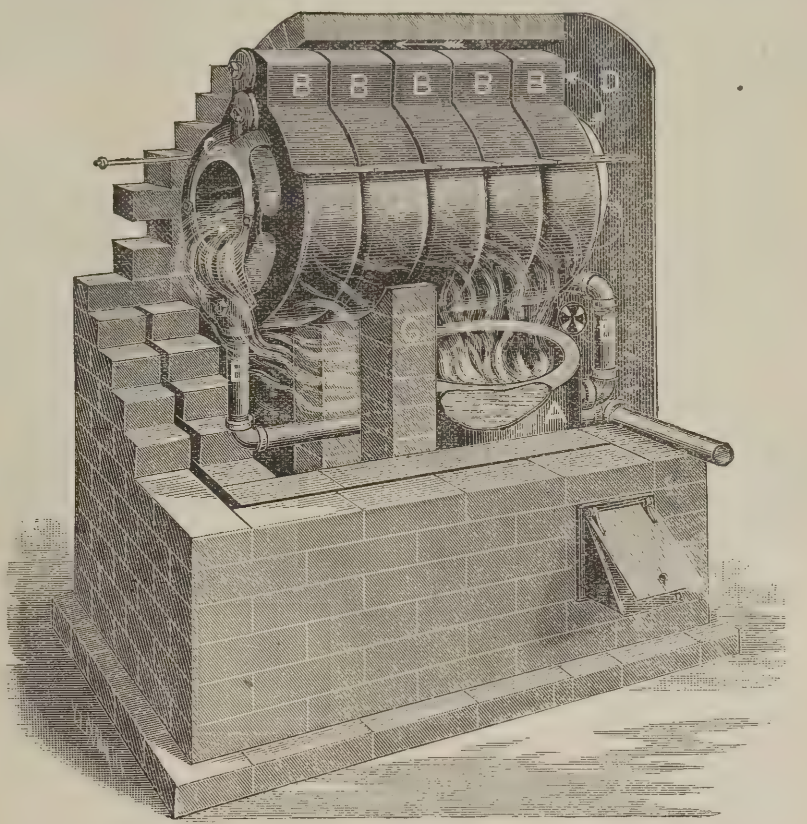


The Perfection Radiator.

inches and 20 inches. The radiator 45 inches high, with two loops, has a heating surface of 10 square feet, while the same hight with 32 loops has a heating surface of 160 feet. The two-loop radiator, 20 inches high, has 4 square feet of heating surface, and the 32-loop radiator, 20 inches high, has 64 square feet of heating surface. The hights and capacities of the Perfection hot-water radiators are the same as those above given for the steam radiators. The Michigan Radiator Mfg. Company have erected an entirely new plant for the exclusive manufacture of radiators, and have equipped it with the best machinery, the present capacity of their works averaging about 8000 feet of radiators daily.

The Lansdale Steam Heater.

A steam heater of somewhat peculiar design is being manufactured by Heebner & Sons, Lansdale, Pa. The heater is known as the Lansdale, and a general view of it with the brickwork broken away is shown in the illustration herewith given. In presenting this heater to the trade the manufacturers refer at the outset to the advantages it possesses in being walled in with brick. The objections ordinarily raised on account of difficulty of repairing, due to the walls, is said to be entirely overcome, the construction of the Lansdale heater being such as to allow the boiler to be removed without injuring the walls in the least. The second objection, that of the expense of setting, is also said to be overcome, the cost of setting their No. 5 heater being not over $15. With their walled-in boiler the heat passes underneath, through the center, through the sides, around each section and finally over the top of the boiler, passing in all five times back and forth. Another advantage of the brick-setting is that the boiler does not heat the cellar. Referring now to the illustrations with the indicating letters, A is the fire-pot; B B, sections of the boiler; C C, cap or bonnet to form return flue, the arrow showing the course of the heated gases; D is the boiler front; E E, circulating pipes, and G, bridge wall. The fire-pot, which is of sufficient depth to carry a heavy fire, is a hollow rim through which the water passes from the feed-pipe, then through the circulating-pipe into the boiler. The grate can be dumped to clean the fire-box, and the clinkers are easily removed, the special feature being the size of the ash-pit, which insures safety from burning the grate and renders it unnecessary to frequently clean out the ashes. The boiler, as the cut shows, is made of rows of hollow cast-iron rims or sections constructed so as to form a steam drum and a sufficient water space



The Lansdale Heater.

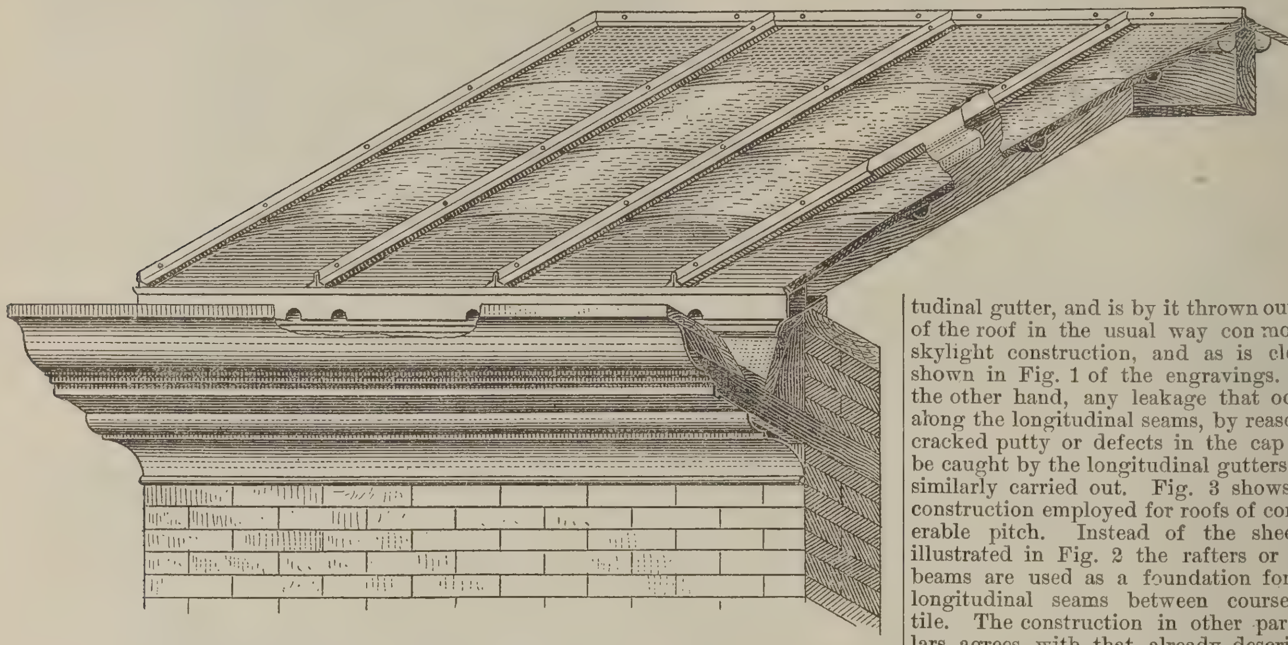
with a free circulation. The shell of the section is $\frac{5}{16}$ inch thick, and each section is tested separately to a pressure of 150 pounds. The joints are packed with asbestos packing and the sections are held together by three steel bolts running through the whole length of the boiler. The lugs along the side rest on a plate fastened in the wall supporting the boiler and serve as a slide, so that by simply taking off the front and uncoupling the pipes the boiler can be easily repaired without pulling down the wall. The openings in the boiler are so situated that the products of combustion pass under the rear end, return through to front, then back through the two lower flues, through the bonnet C to top flues, to front, then back over the top of the chimney, thus passing the boiler five times before escaping finally. Furthermore, a space of ¾ inch is left between the sections, which allows the heat to pass on all sides. The flues are formed by annular ribs so constructed as to effectually utilize the heat. The boiler is fitted up with the usual fixtures and has a damper draft and damper regulator that opens the door and which can be adjusted to carry any desired steam pressure. A boiler of five sections, which is said to be large enough for an ordinary dwelling, occupies a space 3 feet 6 inches in length, and 3 feet 4 inches high. Where a greater heating capacity is desired, sections can be added without trouble. The manufacturers will further furnish a coal magazine as desired, but do not recommend them, if they refer to them as uneconomical.

A THIN SHEET of clay well burned is a tile, whatever may be its shape or its use. In the early ages roofs were almost exclusively made of tiles, but the use of tiles was by no means confined to roofing.

ROOFING NOTES.

The Cooper Tile Roofing.

A form of tile roofing which, in some respects, is a radical departure from anything which has preceded it in use, has recently been perfected and patented by A. W. Cooper, well-known to the sheet metal cornice trade, and for several years past superintendent of the cornice department in the establishment of Knisely & Miller Bros., No. 129 South Clinton street, Chicago, Ill. In the features of this roofing, Mr. Cooper has employed certain ideas, the utility of which have been thoroughly demonstrated in the practice of the skylight-makers of the country for many years past. Other features are novel in themselves, and will be understood by reference to the accompanying engravings and the description which we append. A general view of a section of a roof covered with tile by the Cooper system is shown in Fig. 1. It will be seen that it resembles a skylight in various features. The longitudinal ribs, both with respect to the cap above and the gutter construction below, are similar to those used in skylight work. On the other hand, the cross joints between individual tile are provided with gutters on the underside, of a form somewhat resembling those employed in skylight practice. Just how these cross gutters are constructed, and what their relationship is to the longitudinal gutters, is clearly shown in the section presented in Fig. 4. Figs. 2, 3 and 5 present cross sections through the roof, showing the construction of the longitudinal gutters and caps. These figures also show how the cross gutters communicate with the longitudinal gutters. Fig. 2 shows a cross-section through a tile covering as arranged for a flat roof. The roof is sheeted in the usual way and at intervals strips, 2 inches square, are nailed in place. On these strips are placed the sheet-metal shapes forming the rib and its gutters. The tile are next put in place with their cross gutters communicating with the longitudinal gutters already referred to, and, lastly, the caps are put in place, forming a water-proof covering against the ribs. The material out of which the tile are to be made varies according to circumstances. The inventor refers to a glazed tile, and also to plates made of cast iron, variously finished for protection against oxidation, composite plates and to plates of different materials either or all of which seem to possess special advantages under different circumstances. The general idea is to embed the edges of the tile in cement, and by this means to make the roof absolutely water-proof at the outset. It is well known, however, as has been demonstrated by experience in skylight work, that cement or putty, whatever is employed for the purpose, owing to expansion and contraction of the plates will ultimately crack. For this reason the inside gutter system is provided. Any water that by accident drives up between abutting ends of tile in a given course is caught by the cross gutter and is carried to the side or longitudinal gutter, and is by it thrown outside of the roof in the usual way common to skylight construction, and as is clearly shown in Fig. 1 of the engravings. On the other hand, any leakage that occurs along the longitudinal seams, by reason of cracked putty or defects in the cap will be caught by the longitudinal gutters and similarly carried out. Fig. 3 shows the construction employed for roofs of considerable pitch. Instead of the sheeting illustrated in Fig. 2 the rafters or roof beams are used as a foundation for the longitudinal seams between courses of tile. The construction in other particulars agrees with that already described. Fig. 5 is the alternative construction, and compares particularly with Fig. 2. In place of a detached metal cap, one of the tile in this case is formed with an edge which laps over the rib. Figs. 6 and 7 show the construction used in iron roofs, both with the T-iron in the usual position and also reversed. These compare more directly with Fig. 3, illustrating wood construction. In the patent papers of the inventor various features of construction are provided for, some of which are not illustrated in this connection. For example, instead of making the form of the tile arched, reaching from rib to rib, it may be of inverted V-shape, forming an angle midway between the ribs. Again, instead of the cross gutters being formed integral with the tile, as shown in section in Fig. 4, they may be constructed of separate sections of sheet metal laid in between the abutting tile. All these features are covered in Mr. Cooper's patents, and are referred to as illustrating the wide range of application and the variations that may be made without going outside of his system.



The Cooper Tile Roofing.—Fig. 1.—Isometrical View of Portion of Roof Covered with Tile by the Cooper System.

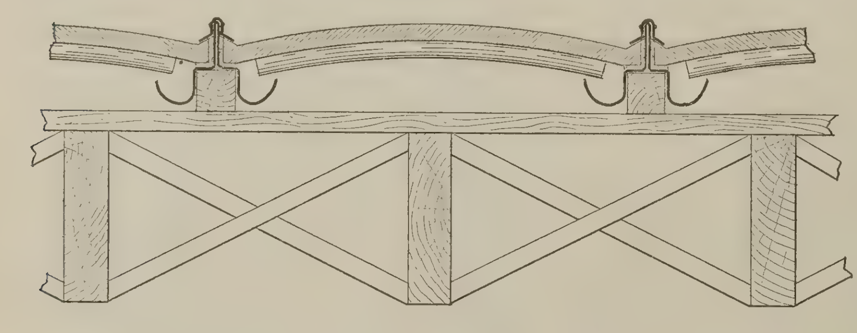


Fig. 2.—Cross-Section through Tile Covering as Arranged for Flat Roofs.

A want exists throughout the country at large for better roofs than are at present provided, using the common construction now in use. Architects of important buildings, including Government structures, assert that cost alone is not considered in matters of this kind, and that if perfect roofs are secured their cost, whatever it may be, will be readily paid. Mr. Cooper's idea in producing the roof which is here illustrated, and which he is about arrang-

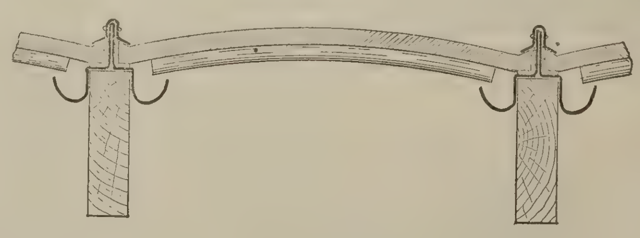


Fig. 3.—Section Showing Construction for Pitched Roof.

ing to introduce practically to the notice of the trade at large, is to use tile, a material that has much to recommend it for the purpose in a way to be more satisfactory in point of results obtained than has heretofore been secured. Imbedding the tile on all four sides in cement, and providing for any possible leakage where joints are opened by frost, or by contraction and expansion, are depended upon as features of the roof. That the system has much to commend it to the attention of practical men our readers will at once perceive.

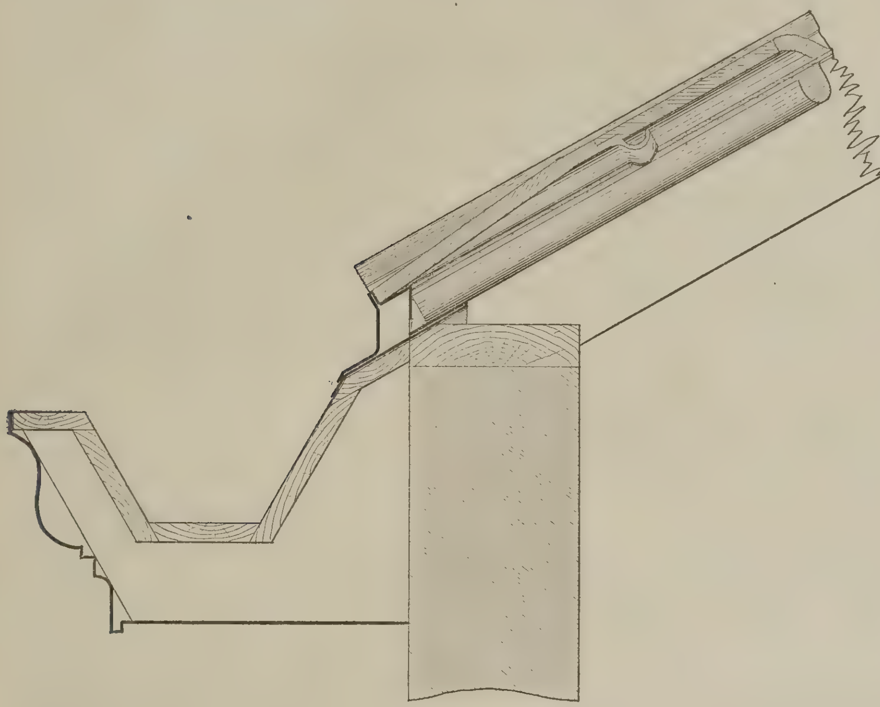


Fig. 4.—Longitudinal Section through Coopers' Tile Roofing.

Prepared Roofing.

The Cincinnati Corrugating Company, Cincinnati, Ohio, have recently issued a circular entitled "Prepared Roofing," from which we gain the following items, some of which will certainly interest our readers, if they do not provoke discussion: "In the course of our large experience, all over the country, we have frequent mention made of prepared roofing. The history of each case, unfortunately, ends in the same way—namely, in disappointment and disgust. If there is one small enterprise which more often than any other dashes to the ground the hopes of the average citizen, it is an experiment with this kind of material. It is foisted upon an innocent public and advertised under various forms and styles, but it is the same old, soft roofing, after all. One day it masquerades as one kind of roofing, another day as another kind of roofing, and still a third time with still another new name. "Ready Roofing," or "Prepared Roofing," or "Specially Prepared" and "Patented Roofing," are terms as frequently met with as any. Trade opened earlier than usual last spring with an unusually large batch of sorrying letters from misguided individuals who had been persuaded into the purchase of cheap prepared roofing. Every case showed that the roofing had been well prepared for the purpose of catching the unwary, the tone of one letter, especially, coming from a Southern State and giving the writer's experience with soft roofing was both amusing and painful. One honest, but unsuspecting, Indiana farmer was overpersuaded by a plausible agent into an order for a coal-tar-felt composition roof, to be put upon his building simply because of its alleged cheapness. What was the result? Before the farmer had got fairly through groaning over the surprising bill for this cheap roof, nearly $3.75 per square, or about as much as a better roof would cost, his soft composition went back into dough and he was compelled to take it down. Thereupon he substituted a permanent roof of corrugated iron. Our men recently re-covered a roof at Germantown, Ohio, where they found a so-called "rubber roofing," which had been in place two years. To say that it was in a miserable condition feebly expresses the circumstances. The covering was drawn, blistered, wrinkled and rent beyond recognition. It had, in fact, become a thorough wreck in that short space of time, and the only thing to be done was to tear it off and replace it with a roof of less seductive name but composed of more substantial material. Less than three months ago the Canal Building—that is, the machinery building for the Cincinnati Centennial Exposition, was covered with a coal-tar paper roof familiarly designated as an asphalt roof. This material was used on account of its alleged cheapness. The experiment has proven a complete failure, for on the occasion of the first heavy rain the roof leaked like the traditional sieve. The commissioners, accordingly, were compelled to have another roof put on the first. The combined expense of the two cheap roofs is far above that of one good roof. Incidents of this kind could be cited until the reader became wearied. As many of your readers know, the lightning-rod canvasser has almost entirely disappeared. In lieu of that brilliant but dubious vocation, however, there is the same oily-tongued class of agents going about taking in their victims with patent prepared roofing. It is of such a character that enough of it can be hauled in a wagon to cover several houses. An interested public should remember that most of the types of soft roofing are of the same general character—namely, they resemble that of tarred paper. When they are new they look very substantial and nice, when they get damp they become mushy and then when they get dry again they crack. Their cost, in the first place, is nearly as much as a substantial roof. Their makers sometimes put forth the statement that they are splendid for putting under iron roofs. This is, in reality, all they are good for. It is when telling this truth that the makers manifest a lucid interval, for in the end when these roofs are used iron or steel roofing must be put on top.

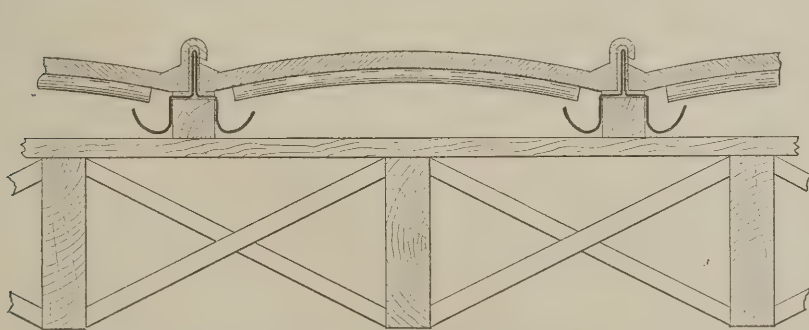


Fig. 5.—Section Showing the Cooper Tile Roofing as Constructed with Lap Joints.

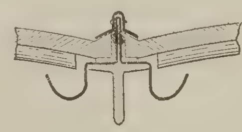


Fig. 6.—Section Showing Construction for Iron Roof.

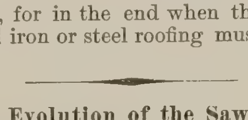


Fig. 7.—Iron Roof Using the T in Reverse Position.

Evolution of the Saw.

Every woodworker must have asked himself, first or last, what was the origin of the saw? Who invented it? As a truism, it may be asserted that every instrument which the mechanic uses has a history. Some of the tools were brought into being by inventive genius; others seem to have grown into their present shape through a long series of changes. The simpler tools have been in use for centuries under one form or another. At first they were only rude suggestions of what they afterward came to be. The history of most tools is traditional in character, and, in many instances, is mixed up with mythological references. According to one of our exchanges, saws have been found in Germany and Denmark which date back to the bronze age. The metal of which they were composed was cast into a thin sheet and serrated by breaking the edge. Equally interesting discoveries are claimed to have been made in our own country. It ha

been found that saws made of obsidian, which is a kind of glass produced by volcanoes, were used during the stone age in Mexico, and saws and knives of the same material have been found in the alluvial deposits of New Jersey, thought to have been sent hither from Mexico by the action of the water. The Phœnicians are among the earliest nations which are thought to have used the saw. The scholor is not surprised to find a very pretty story accounting for the discovery of the saw in Greek mythology. Here the inventor is said to have found the jaw-bone of a snake, which he imitated by jagging an iron plate. One day the uncle of the inventor murdered him in a fit of jealousy, so the story goes, and, if the liberty may be taken of filling out this little romance, by plunging one of the poor young man's own saws through his heart. The lacustine and other early inhabitants of Europe are credited with having saws made of flint, and the natives of the West India Islands had saws made of notched shells. The Japanese saw is a curiosity. It is shaped something like a butcher's cleaver. The shank is drawn into the handle, which is flat, where it is secured by being wrapped with split cane. The teeth are described as being very narrow and pointed toward the handle. Some of the saws used by the ancient Egyptians are exceedingly rude and imperfect, consisting of long, thin blades, ragged at the edges, and driven into rough pieces of wood. It is from such crude and inefficient implements as these that the modern saw has been developed. The law of evolution has been operative here, as the philosopher might say, as it has been elsewhere.

American Forestry.

The annual report of the division of forestry, Department of Agriculture, recently issued, contains some very interesting information. From an inspection of the import statistics it appears that the import duty laid upon manufactured lumber in 1872 had the effect at first of decreasing importations from Canada by from 50 to 60 per cent. until 1876–77 when an upward tendency of imports began. A comparison of the imports of the last three years with those of the preceding three, however, shows a noticeable decline in all classes of foreign products from the amounts to which they had gradually increased up to 1884, when the importation of manufactured lumber reached nearly the same amount that was imported in 1872. "For the decrease in unmanufactured wood," said Mr. Fernow, "the Canadian export duty of $2 on logs may serve as an explanation, but other causes must have worked to effect the reduction of manufactured lumber in the face of a decided enhancement of value of product. The difficulty of access and increased distance from the market is probably the explanation." At the present stage of development, it is suggested that, so far as the saving of standing supplies is concerned, there need be no fear or hope from foreign competition, for the "quantity of standing pine in the United States and Canada is reduced to a condition of absolute control; it is held in strong hands on both sides, and will not be lightly frittered away." The stumpage price, it is predicted, which has lately advanced as never before, will necessitate the upholding of present values for manufactured lumber, and an advance of prices is as certain as a decrease of supplies. "An unbiased weighing of the arguments advanced on both sides," says the report, "leads to the conclusion that the removal of the tariff on lumber would have no appreciable effect upon the price to the consumer, nor be detrimental to the lumberman's or sawmill business, nor in the least affect the laboring man; but at the same time no appreciable benefit toward preservation of forests and forest supplies need be expected at this date from such removal." The report concludes with brief reviews of the condition of the forestry interest in each of the several States and Territories.

TRADE NOTES.

STANLEY'S "ODD-JOBS," a very unique tool, first illustrated and described in our issue of July last, has already proven its right to be. The manufacturers, Stanley Rule and Level Company, of New Britain, Conn., report sales of 6000 of these tools at this date; and that without diminishing the demand for their other tools, of which this single one embraces 10 or 12 different kinds. The artistic form of the tool, and the nickel-plate finish, commend it as a holiday present for mechanics or amateurs. The manufacturers announce that a sample will be mailed free, on receipt of the price, in case it cannot be had of hardware dealers.

THE CARD of the Goulds Mfg. Company, Seneca Falls, N. Y., makes a very happy use of the medal idea in the design. They invite the trade to send for their No. 20 catalogue, which is of interest to our readers in general.

IN LIEU of a catalogue of their specialties, the Penrhyn Slate Company, of 101 East Seventeenth street, New York City, are this season distributing a package of loose sheets containing illustrations of some of their more important designs of slate mantels. Each sheet presents one or more designs, together with a few particulars as to style, number and dimensions.

THE COLEMAN HARDWARE COMPANY, 55 Dearborn street, Chicago, and Morris, Ill., have issued a price list showing their hardware specialties. It represents the Nickel Hangers and Rail, the J. G. C. Hanger, Nickel Spring Hinge, J. G. C. Spring Hinge, Nickel Stay Roller, Nickel Farm Gate and Shumard Sash Balance.

THE VERY INTERESTING exhibit of wood-working machinery made by the Egan Company, of Cincinnati, at the exposition recently closed in that city, was the object of much attention upon the part of woodworkers and all who are called upon to make use of machines of this kind. The judges of the exposition awarded the company medals of superiority on all the machines exhibited, which included a No. 4 planer and smoother, a dove-tailer, slat tenoner, woodworker and molder combined, hand and scroll saws and shapers.

GEORGE F. BARBER, architect, a house study of his appearing in the last issue of this paper, and who was formerly located at De Kalb, Ill., informs us that he has recently removed to Knoxville, Tenn., making the change on account of his health.

SAMUEL J. SHIMER & SONS is the name of a firm succeeding to Samuel J. Shimer, Milton, Pa. A specialty of the firm is the manufacture of the Shimer Matcher Heads, devices which are already in use by a large number of the readers of this journal.

THOMAS MORTON, 65 Elizabeth street, New York, presents, on another page of this issue, illustrations of the different styles of metal sash chains which he is manufacturing. Chain attachments are also shown. The utility of metal chains in the place of the old-style sash cord is something that is being very generally recognized at the present time.

A. J. WILKINSON & CO., 180 to 188 Washington street, Boston, direct attention, in another part of this issue, to the Elkins Saw Sharpener, which is described as a saw clamp, to which may be attached a file-handle moving through guides which can be instantly set to any pitch of bevel desired. The handle holding the file moves freely through the guide, thereby making the teeth exactly alike in both pitch and bevel.

THE MILLER LOCK COMPANY, of Philadelphia, announce a change of address from 318 Cherry street to Frankford, same city. The Champion Chest Lock, which this company offer, is used by a large number of our readers with great satisfaction.

THE CINCINNATI CORRUGATING COMPANY, 147 Eggleston avenue, Cincinnati, refer, in another part of this issue, to the promptness with which they fill orders. They say that three-fourths of all the orders received are filled on the day they come to hand. This is made possible by the large stocks of material which the company keep on hand.

A SHORT TIME SINCE the enterprising firm of E. C. Stearns & Co., Syracuse, N. Y., issued a circular in which they gave some particulars concerning the business of manufacturing the Stuart Window and Door Screens. This enterprise has been in progress for two years past. Some of the figures given are of interest to our readers. The total number of screens manufactured in the period is 386,220. This, allowing six screens to a dwelling, would supply 64,370 houses. In lineal feet the moldings used for the window screens amount to upward of 12,000,000, while for doors it would amount to upward of 3,000,000. One hundred and seven tons of castings were employed in the window and door corners, and it would require 138 freight cars of usual capacity to carry the output of finished goods.

J. H. HOAGUE, tool manufacturer, Chicopee, Mass., is directing attention to the Draw Knife Chamfer Gauge, a device which can be applied to any draw knife and set to dimensions. The gauge is provided with a graduated scale.

THE RUSSELL & ERWIN MFG. COMPANY, New York and Philadelphia, direct attention in another part of this issue to Swan's Expansive Bits. This tool, it is claimed, will bore more rapidly than any other, is perfect in construction, and fully warranted.

THE CORTRIGHT METAL ROOFING COMPANY, of Philadelphia, announce a change in the location of their Western office. It is at present established in the Journal Building, Tenth and Walnut streets, Kansas City, Mo.

P. PRYIBIL, Tenth avenue and West Fortieth street, New York, occupies space in this issue, describing his new machine for routing stair strings, and also a new twist machine, or spiral molder, and other novelties.

THE S. A. WOODS MFG. COMPANY, 91 Liberty street, New York, have a new illustrated catalogue, which they are sending out free on application. It includes a large line of wood-working machinery which they are manufacturing.

Manila Hemp in Plaster.

Many builders regard hemp as the only material that can be successfully mixed with plaster in order to produce satisfactory cohesion. According the the *Manufacturer and Builder*, a well-known firm of architects has for several years ordered the use of manila hair in all plastering work done for its clients. In order to satisfy the doubt of some of its contractors, they made the following experiment: The test was made with four plates of equal size, one containing manila hemp, a second Sisal hemp, and third jute, and a fourth plasterer's hair (goat's) of the finest quality. The test was made by suspending weights from the middle of each plate, the ends of which were properly supported. The result was that the plaster mixed with goat's hair broke at 144½ pounds weight, that with jute at 145 pounds, the Sisal at 150 pounds, and the manila at 195 pounds. It should be added that the plaster containing the manila hemp did not break, it only cracked. Though cracked in the center, the lower half of the plate containing the manila when it was suspended, held on to the upper half, and the manila held it fast, though the observer would almost feel confident that the hairs would break under the strain. The three other plates were broken—that is, the two parts of each plate had severed entirely in contrast with the manila plastering. The architects felt that their theory had been proven correct.

Another experiment, made two years ago by a member of the same firm of architects, consisted of mixing two barrels full of mortar, each containing equal portions, by measure, of sharp sand and Thomaston lime, one of the barrelfuls, however, being mixed with the proper quantity, by measure, of manila hemp, cut in lengths of 1½ to 2 inches, and the other of goat's hair, the best that could be procured. After mixing thoroughly with the usual quantity of water, the respective mixtures were put in the barrels and stored away in a dry cellar, where they were locked up. They were allowed to remain there for nine months, at the end of which time they were opened and examined. The hair mortar crumbled and broke apart, very little of the hair being visible, showing that the lime had consumed the hair. The other, containing the hemp, however, showed great cohesion, it being with considerable effort that it was pulled apart, the fibers of the hemp permeating the mass and giving little or no evidence of injury done to it by the lime.